00h00f" 24248960

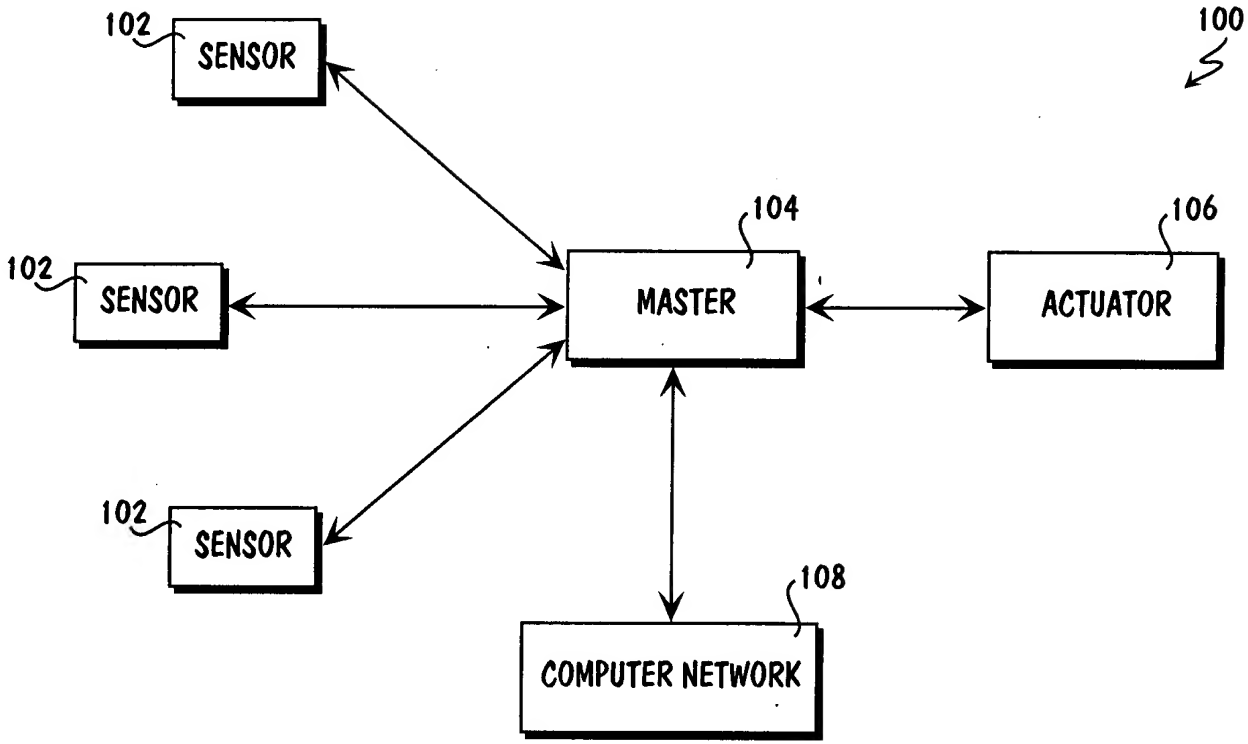
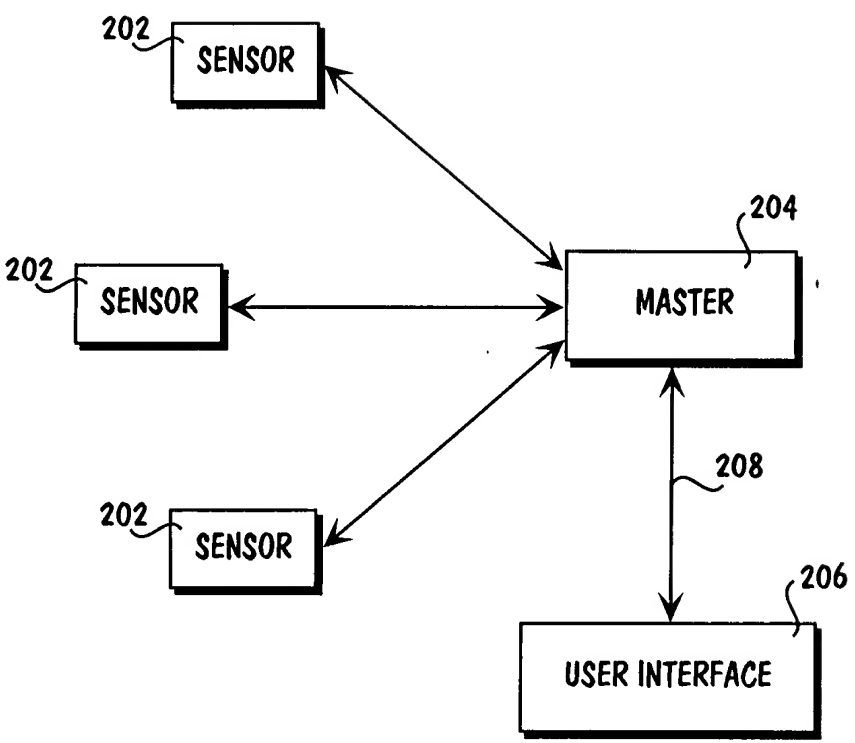


FIG. 1 (Prior Art)

00h00F" 2h2h8960



200

FIG. 2 (Prior Art)

00h00f" 2h2h8960

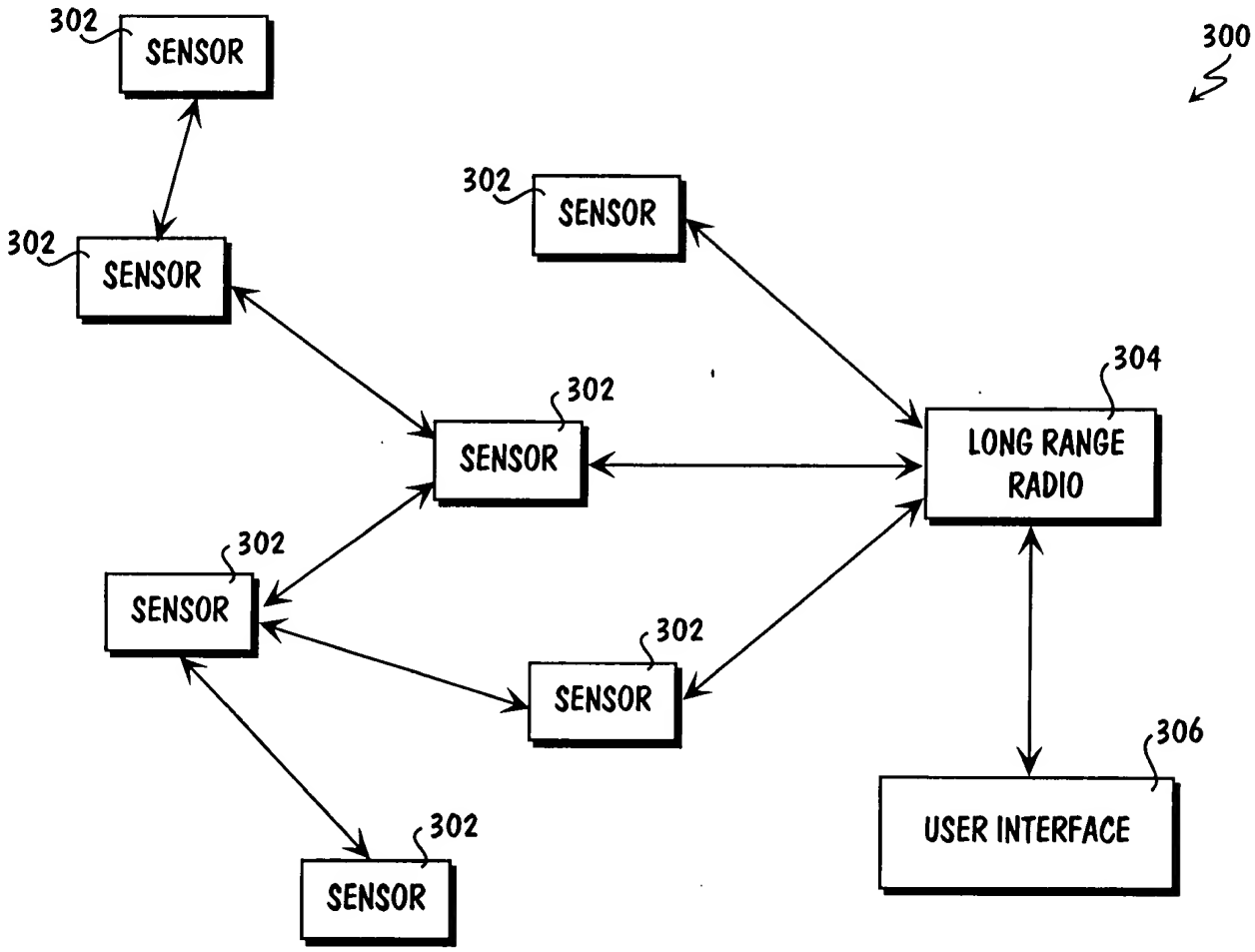


FIG. 3 (Prior Art)

00h00F' 2h24h8960

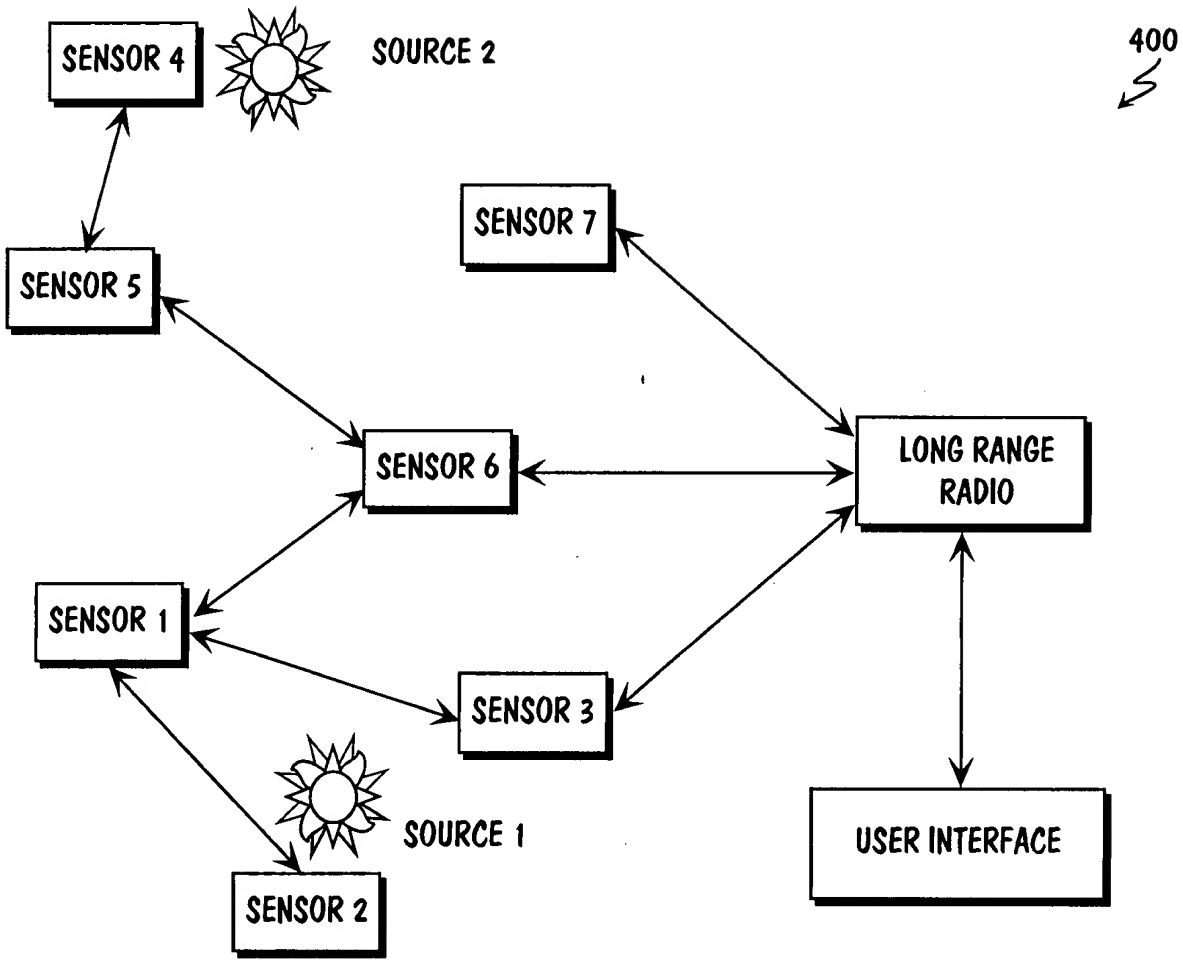


FIG. 4 (Prior Art)

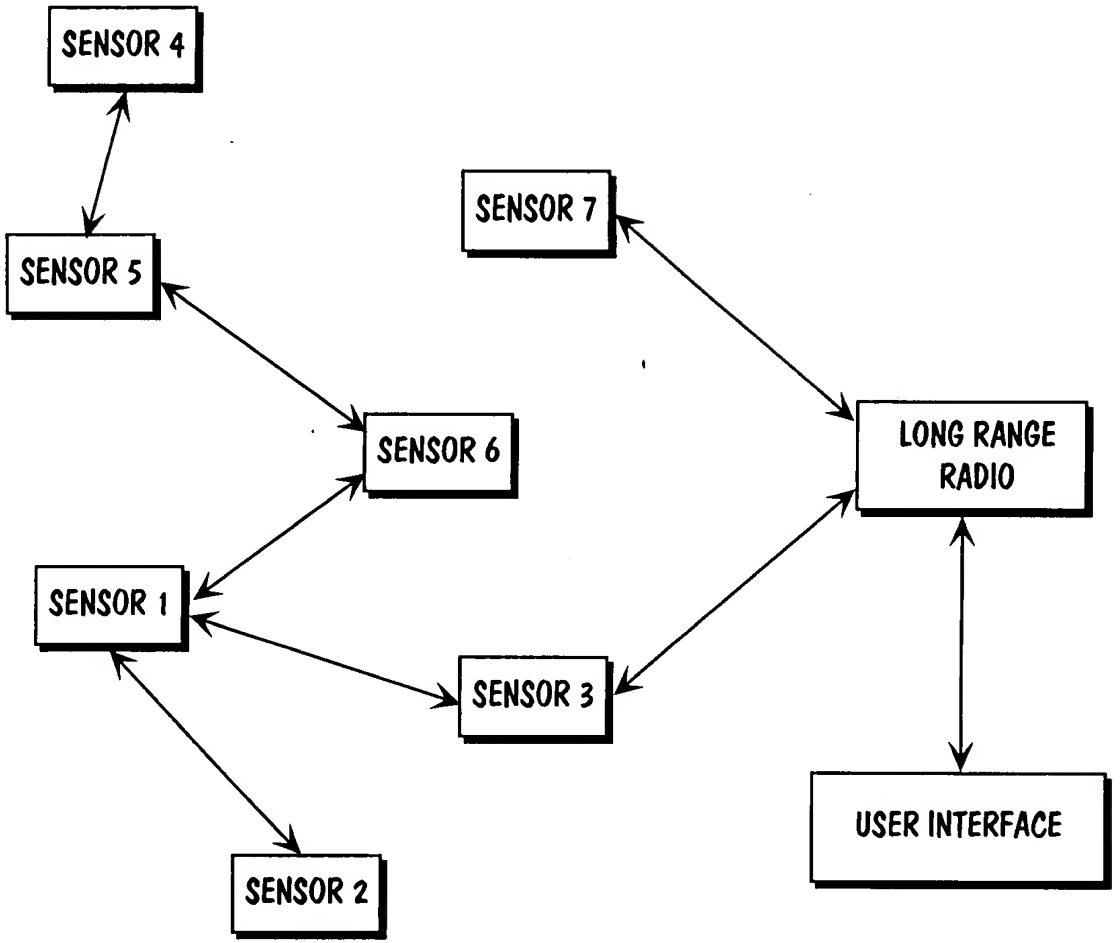


FIG. 5 (Prior Art)

00h00F" 2h2h8960

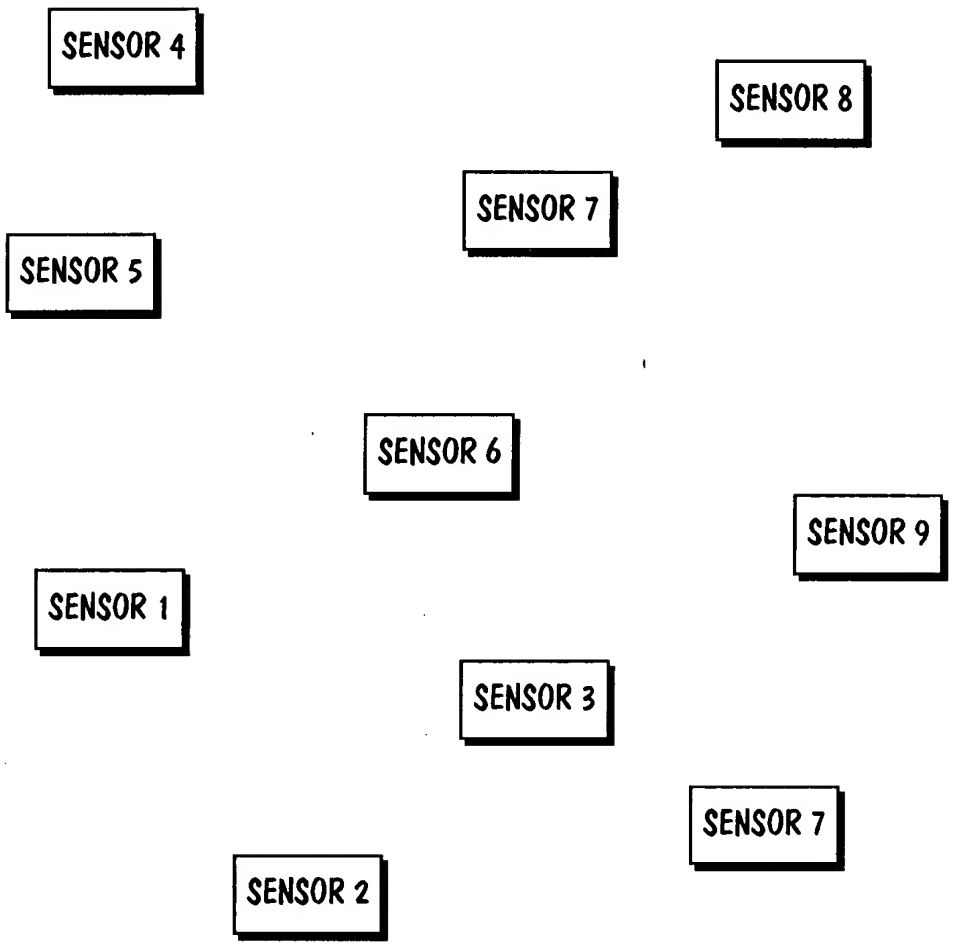


FIG. 6 (Prior Art)

00h00t" 2h7h8960

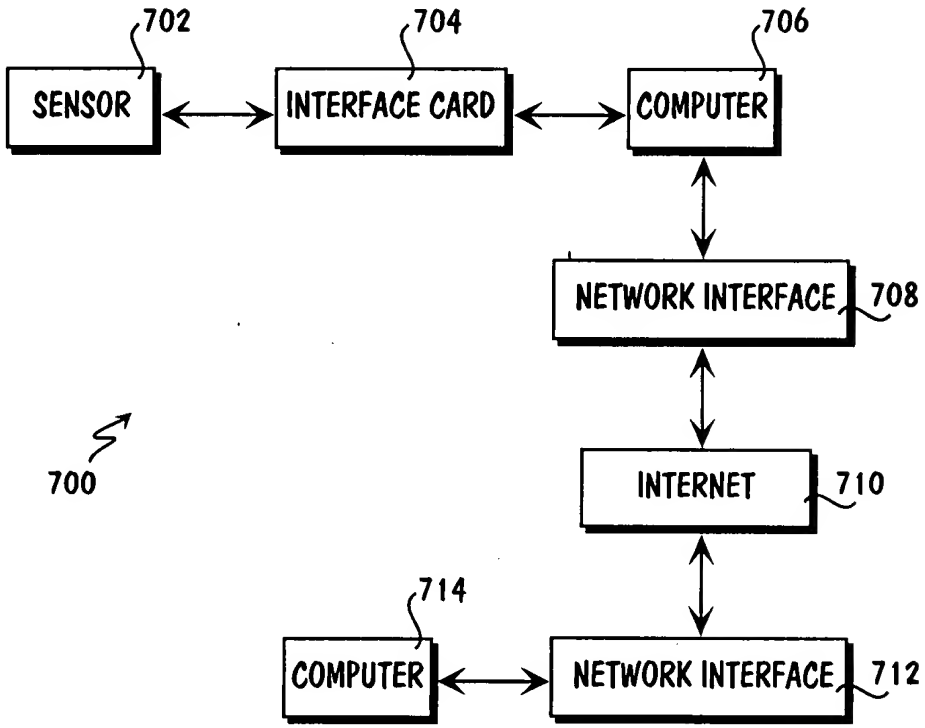


FIG. 7 (Prior Art)

00h00T" 2h2h8960

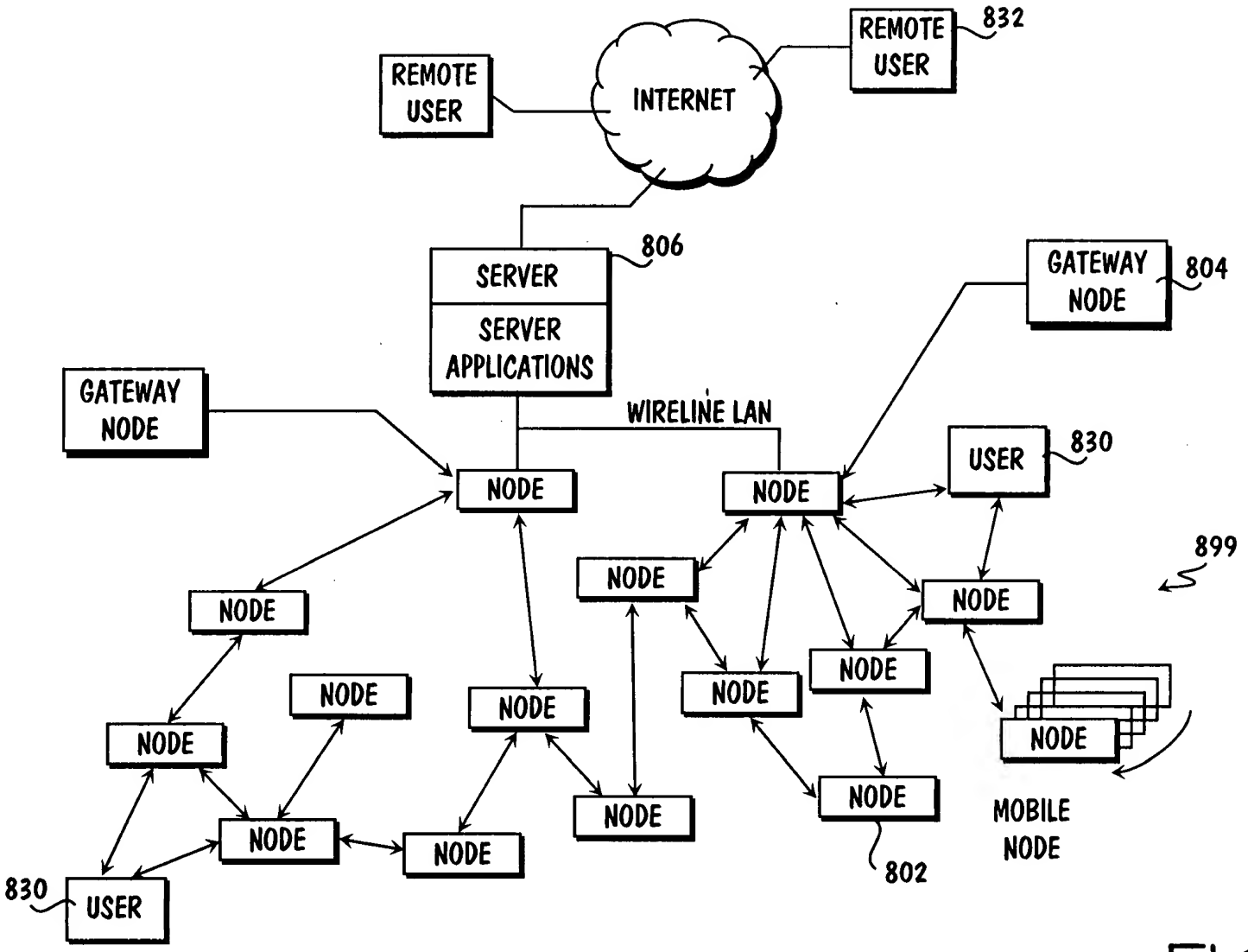


FIG. 8

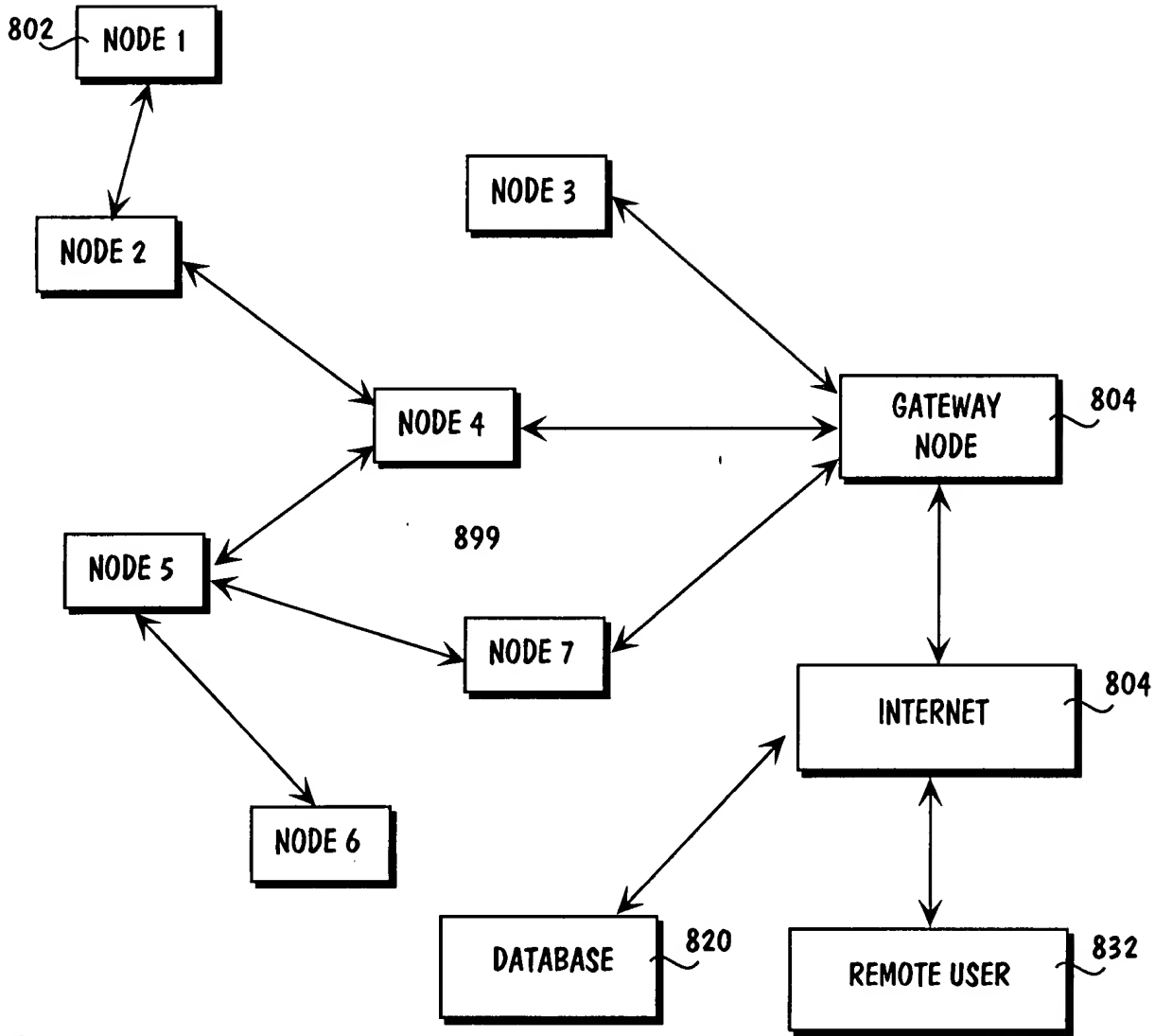

802
NODE 1
NODE 2
NODE 3
NODE 4
GATEWAY NODE
804
899
NODE 5
NODE 7
INTERNET
804
NODE 6
DATABASE
820
REMOTE USER
832

FIG. 9

09694270 - 10040

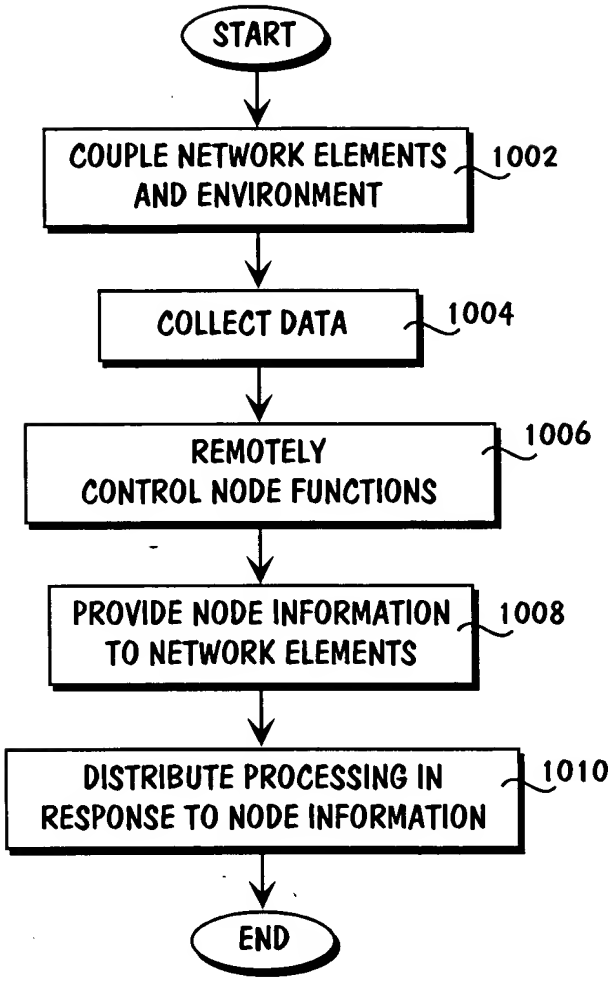


FIG. 10

00h00F"2h2h8960

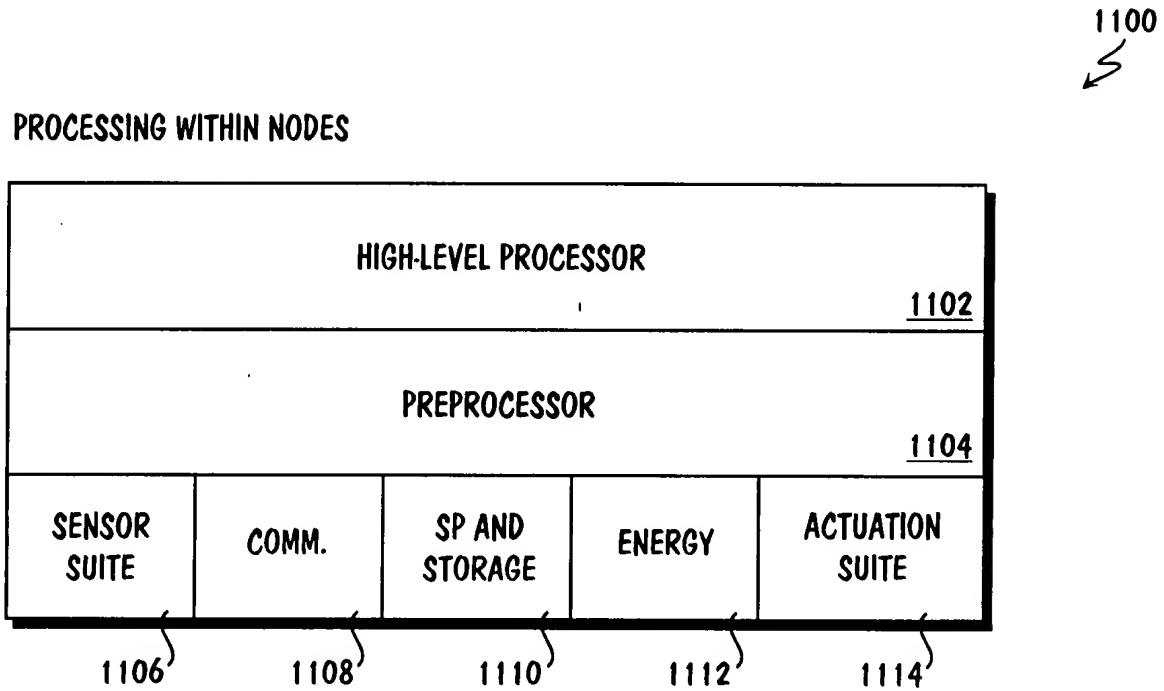


FIG. 11

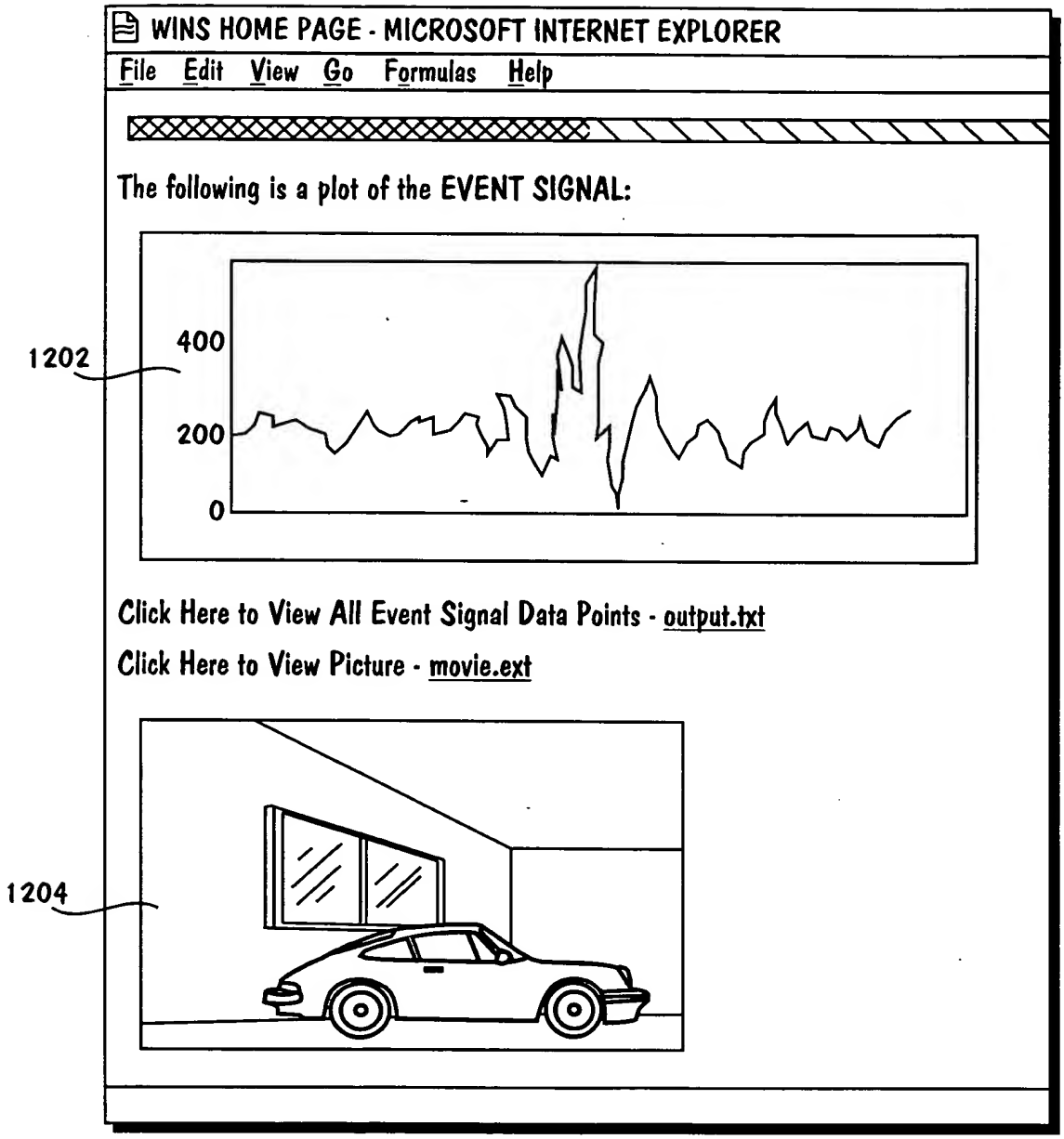

WINS HOME PAGE - MICROSOFT INTERNET EXPLORER
File Edit View Go Formulas Help
The following is a plot of the EVENT SIGNAL:
1202
400
200
0
Click Here to View All Event Signal Data Points - output.txt
Click Here to View Picture - movie.ext
1204

FIG. 12

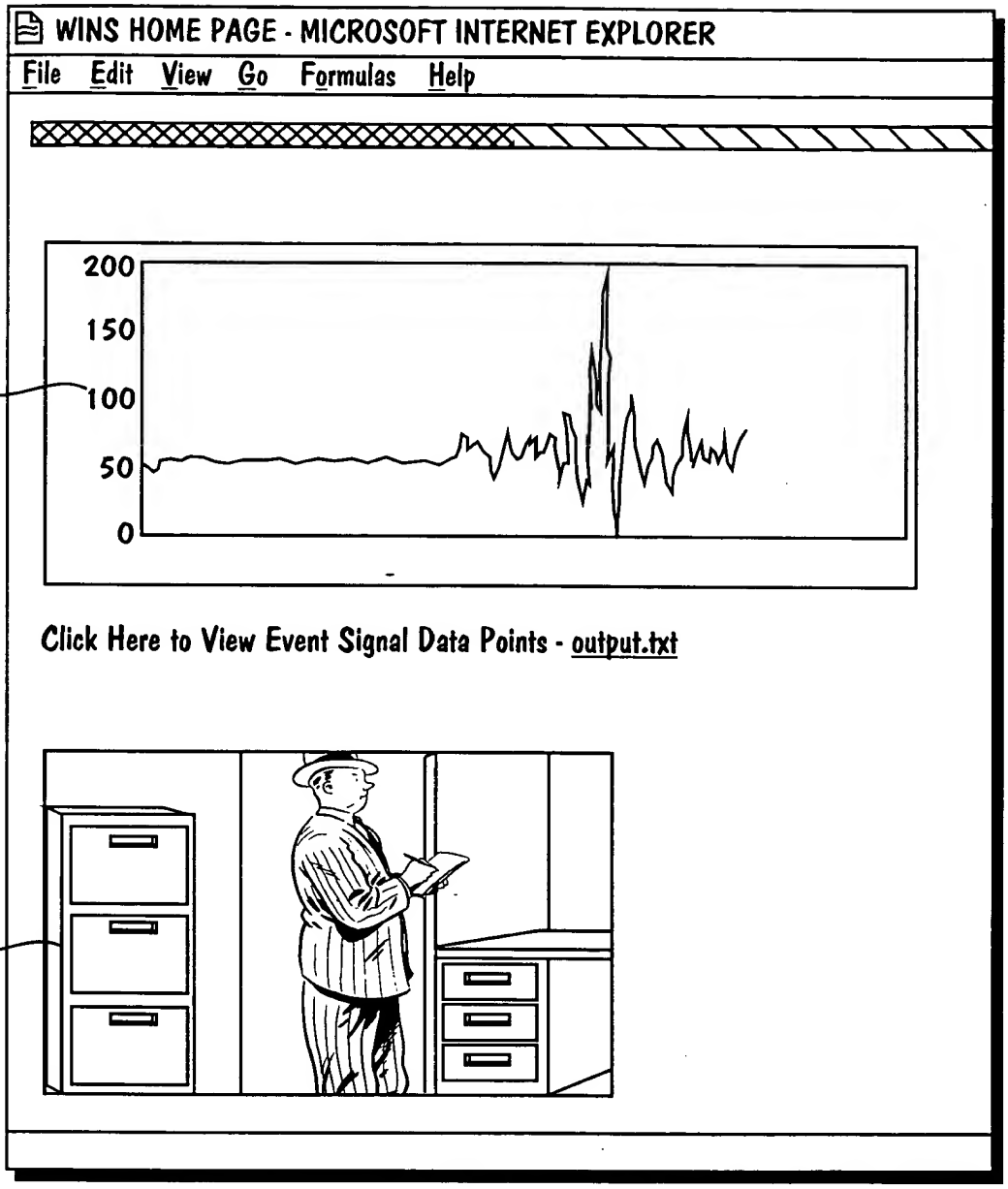

WINS HOME PAGE - MICROSOFT INTERNET EXPLORER
File Edit View Go Formulas Help
200
150
100
50
0
1312
Click Here to View Event Signal Data Points - output.txt
1314

FIG. 13

00h00f" 24h24h8960

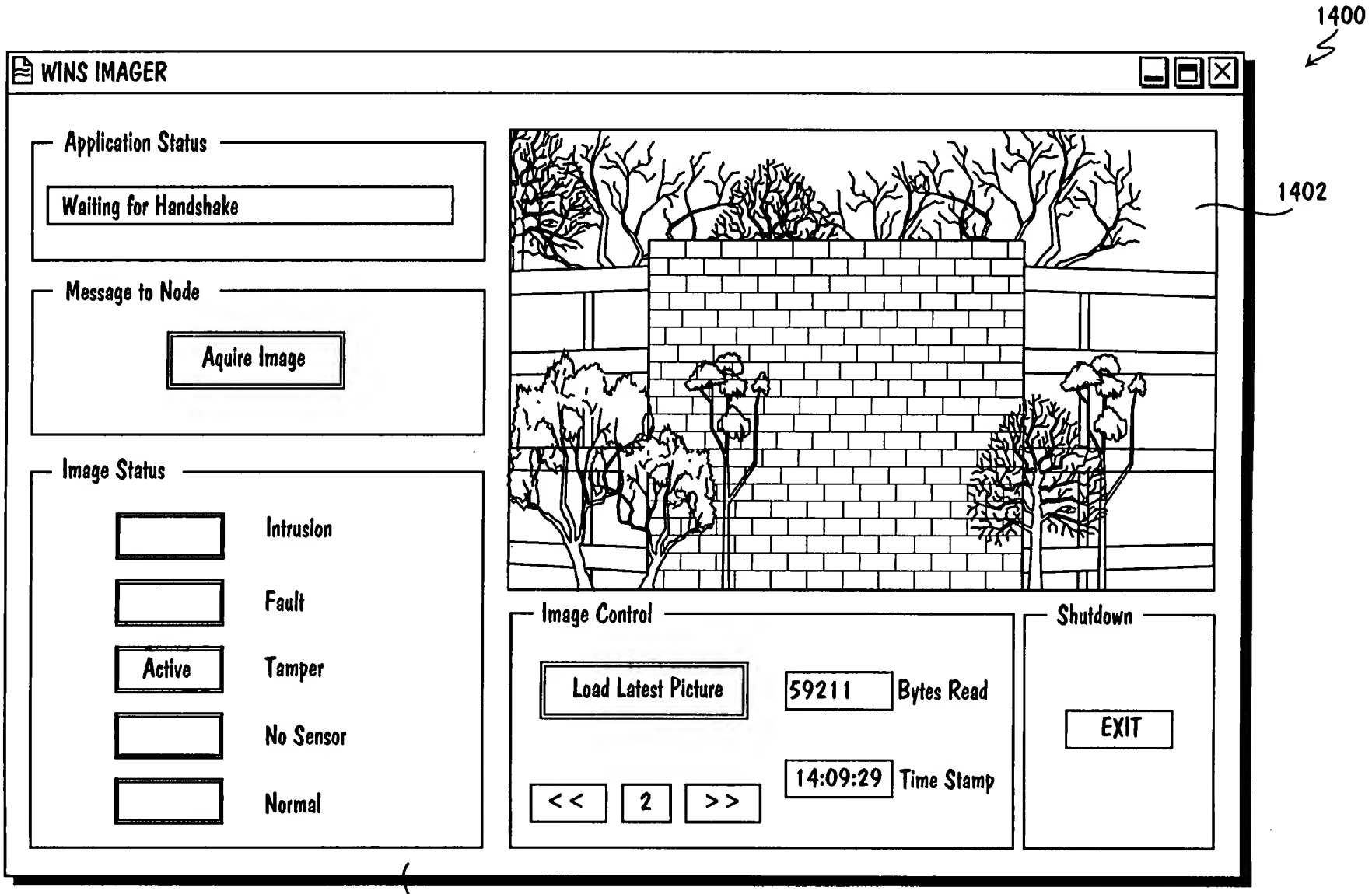


FIG. 14

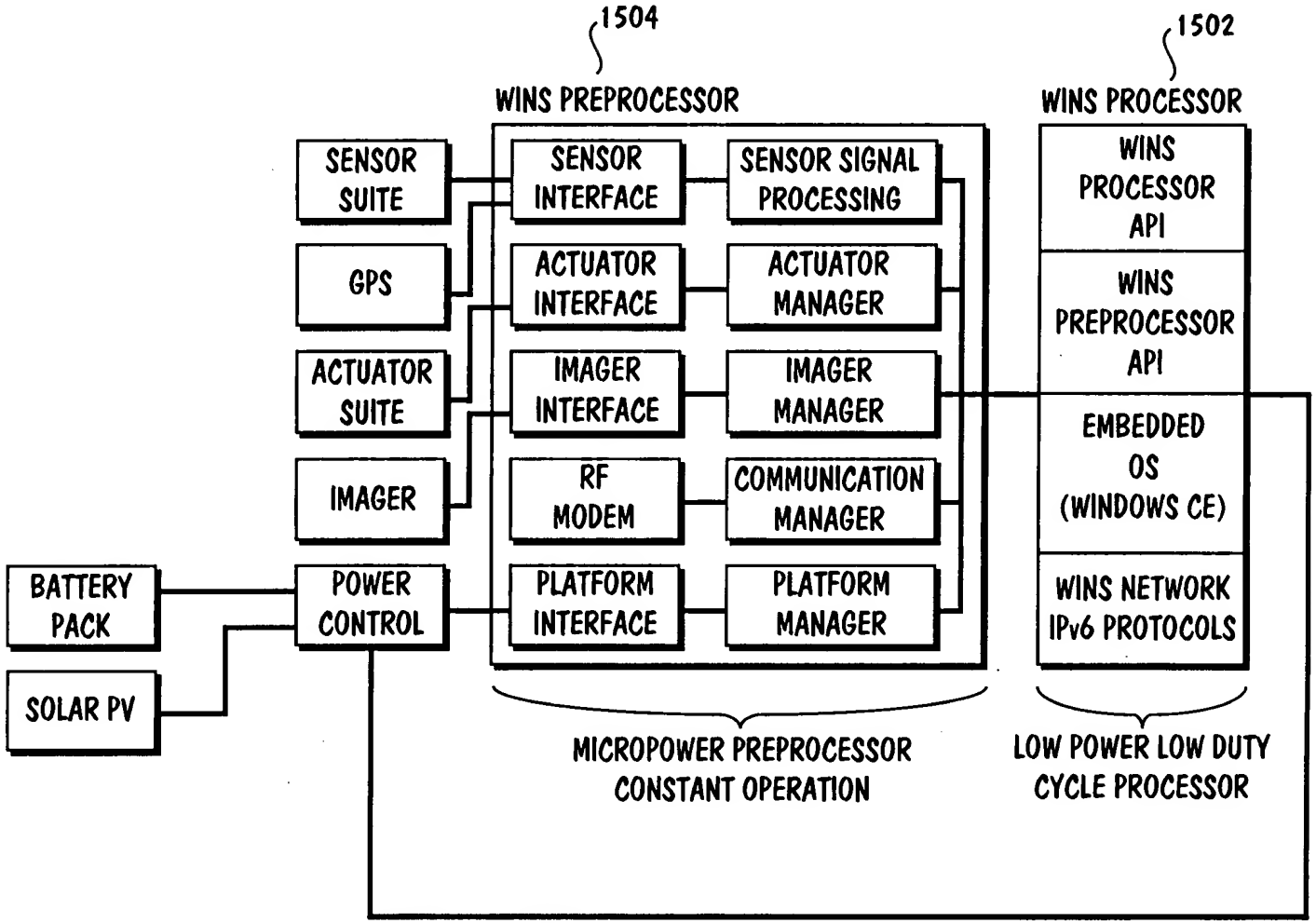

1504
WINS PREPROCESSOR
1502
WINS PROCESSOR
SENSOR SUITE
GPS
ACTUATOR SUITE
IMAGER
BATTERY PACK
SOLAR PV
POWER CONTROL
SENSOR INTERFACE
ACTUATOR INTERFACE
IMAGER INTERFACE
RF MODEM
PLATFORM INTERFACE
SENSOR SIGNAL PROCESSING
ACTUATOR MANAGER
IMAGER MANAGER
COMMUNICATION MANAGER
PLATFORM MANAGER
WINS PROCESSOR API
WINS PREPROCESSOR API
EMBEDDED OS (WINDOWS CE)
WINS NETWORK IPv6 PROTOCOLS
MICROPOWER PREPROCESSOR CONSTANT OPERATION
LOW POWER LOW DUTY CYCLE PROCESSOR

FIG. 15

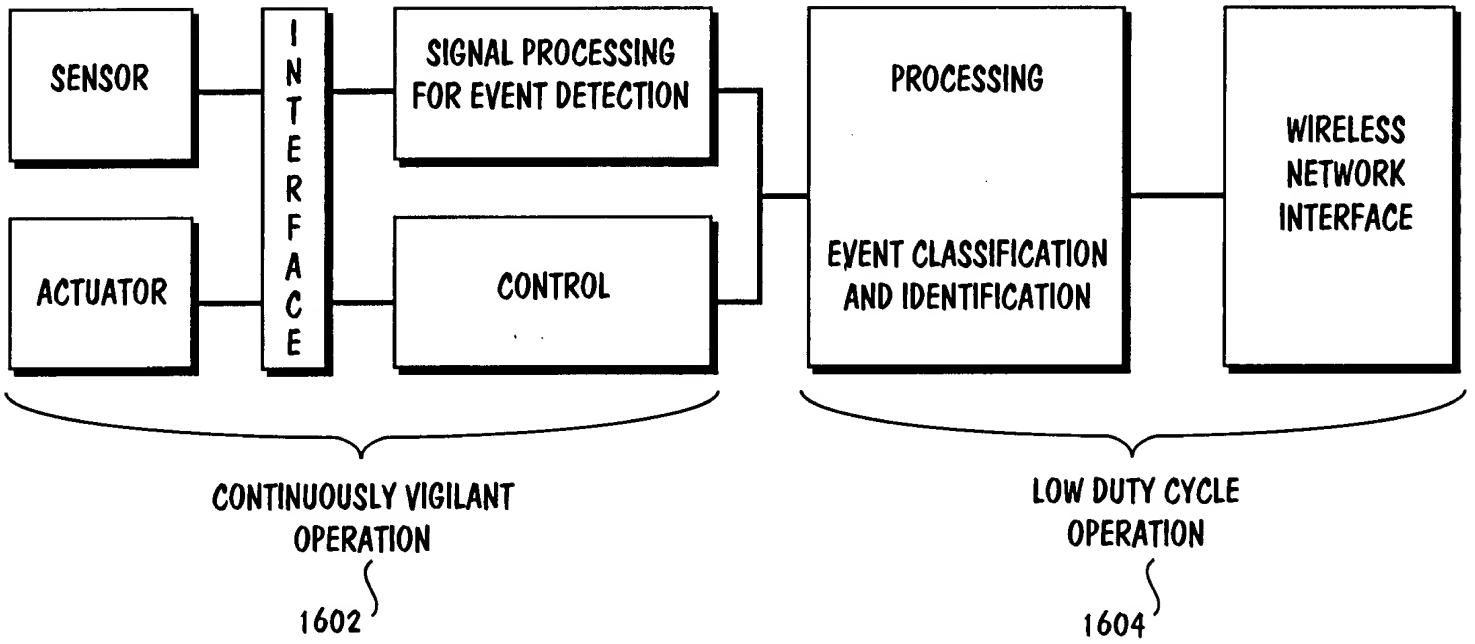

SENSOR
ACTUATOR
INTERFACE
SIGNAL PROCESSING FOR EVENT DETECTION
CONTROL
PROCESSING
EVENT CLASSIFICATION AND IDENTIFICATION
WIRELESS NETWORK INTERFACE
CONTINUOUSLY VIGILANT OPERATION
1602
LOW DUTY CYCLE OPERATION
1604

FIG. 16

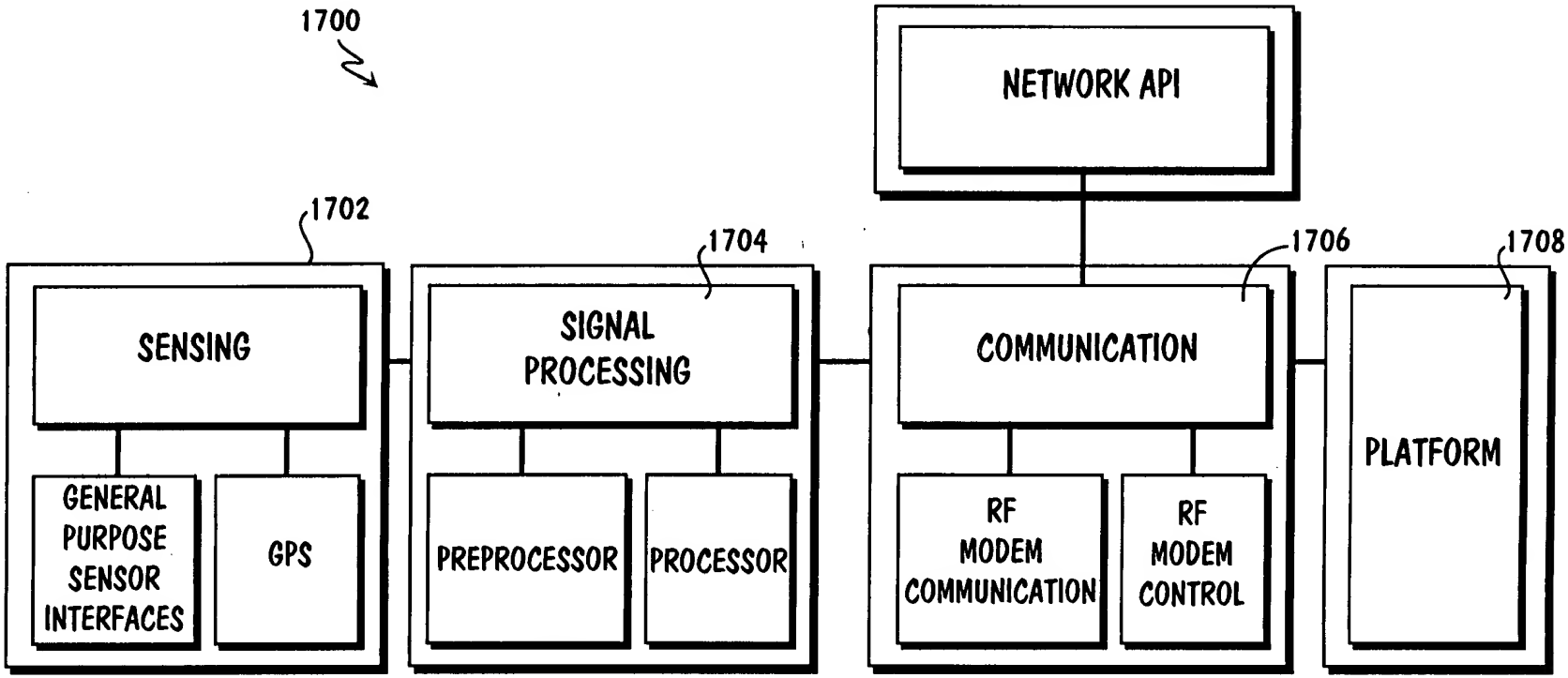

1700
NETWORK API
1702
1704
1706
1708
SENSING
SIGNAL PROCESSING
COMMUNICATION
PLATFORM
GENERAL PURPOSE SENSOR INTERFACES
GPS
PREPROCESSOR
PROCESSOR
RF MODEM COMMUNICATION
RF MODEM CONTROL

FIG. 17

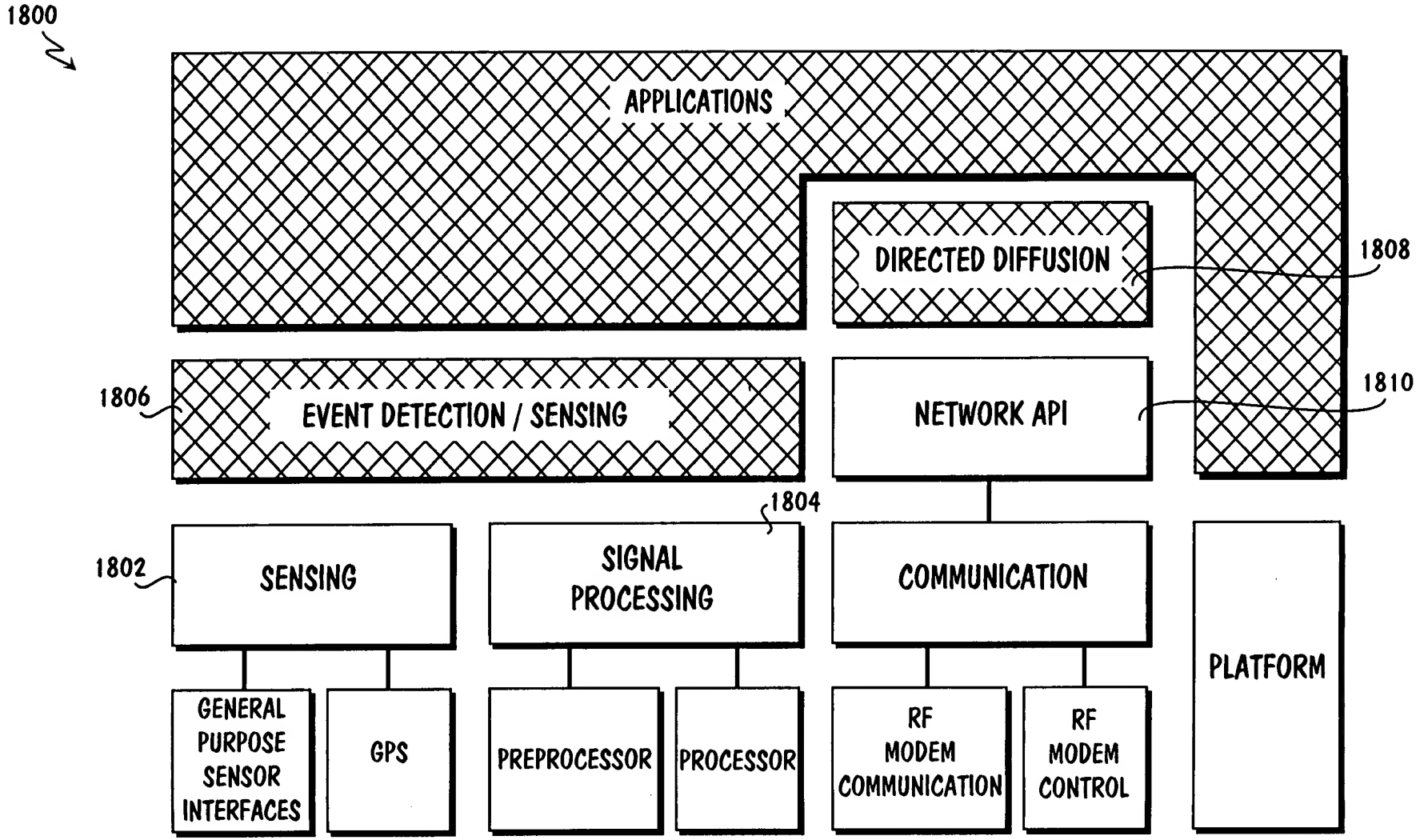

1800
APPLICATIONS
DIRECTED DIFFUSION
1808
1806
EVENT DETECTION / SENSING
NETWORK API
1810
1804
1802
SENSING
SIGNAL PROCESSING
COMMUNICATION
PLATFORM
GENERAL PURPOSE SENSOR INTERFACES
GPS
PREPROCESSOR
PROCESSOR
RF MODEM COMMUNICATION
RF MODEM CONTROL

FIG. 18

00h00T" 2h2h8960

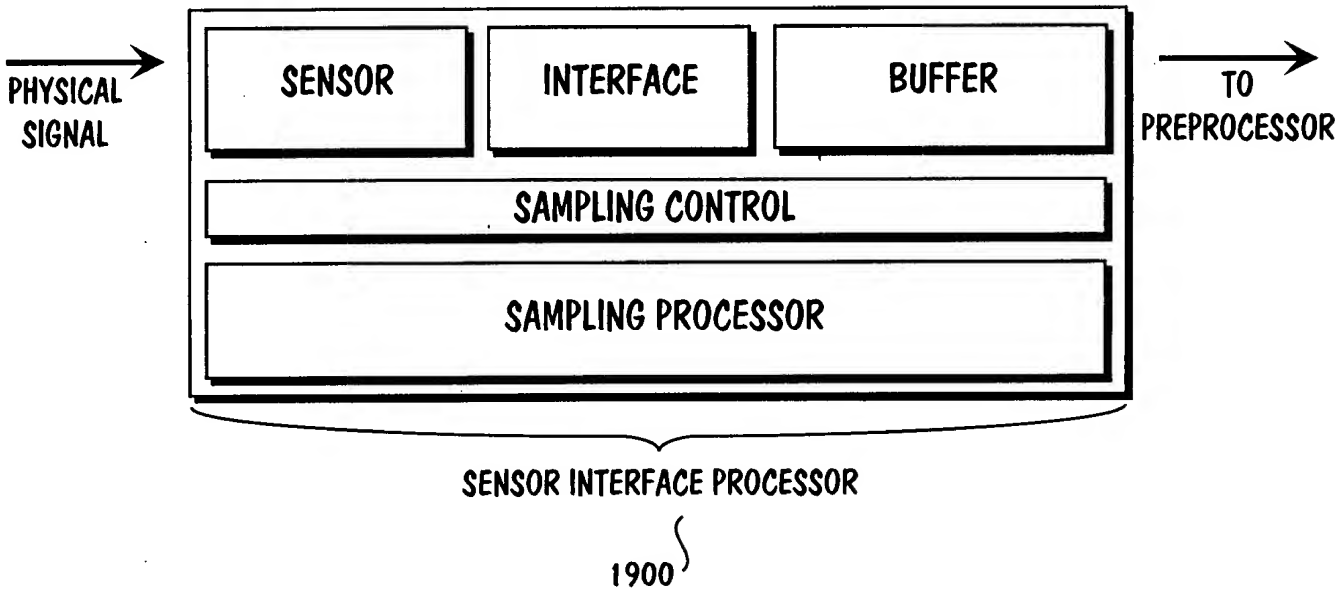


FIG. 19

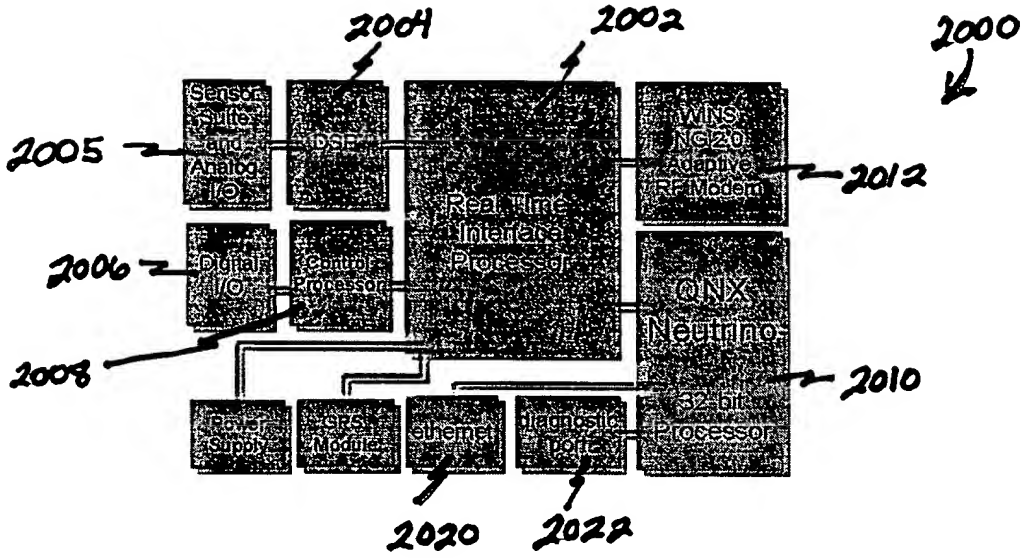
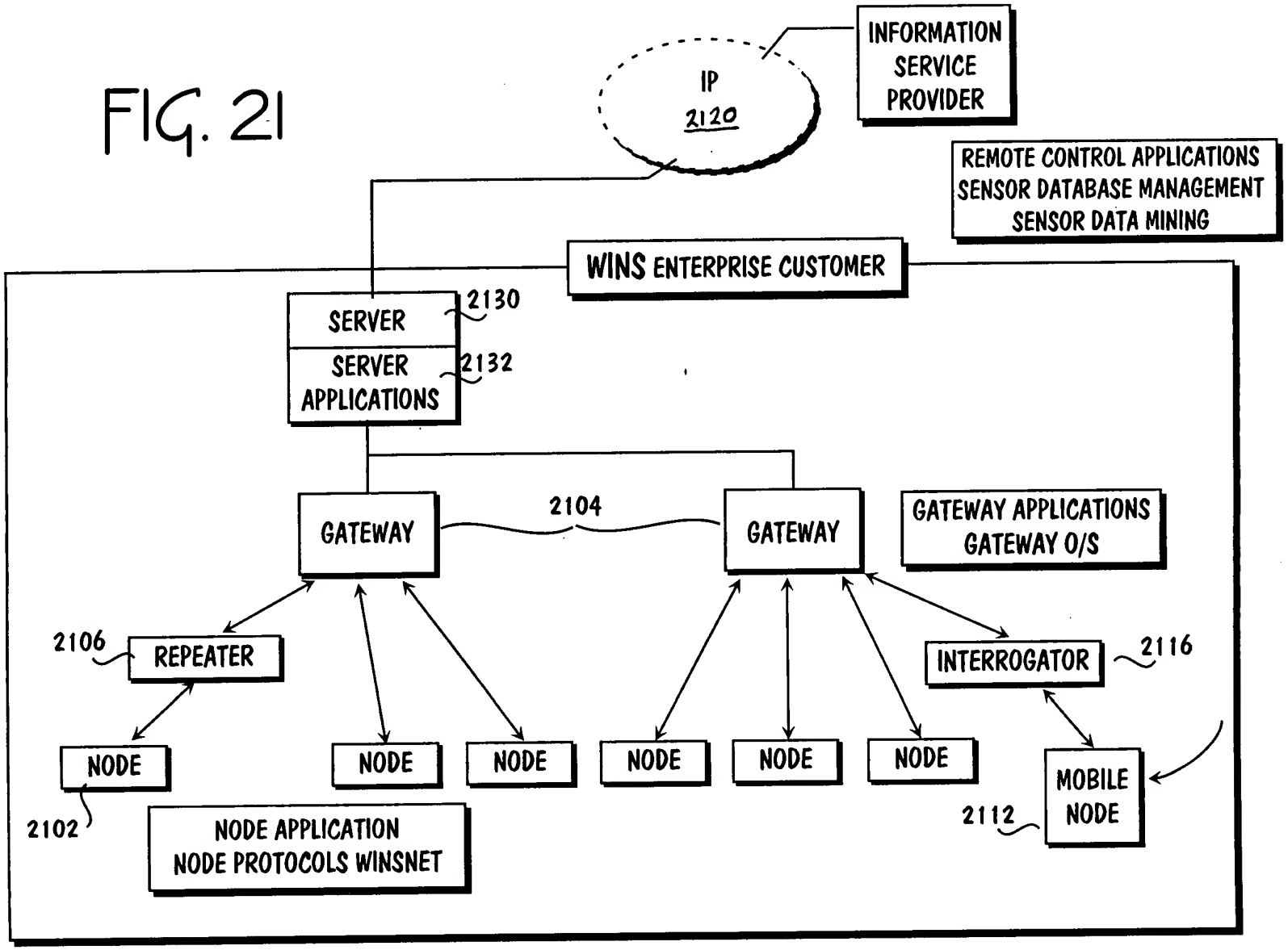


FIGURE 20

09684742 - 100400

FIG. 21


INFORMATION SERVICE PROVIDER
IP
2120
REMOTE CONTROL APPLICATIONS
SENSOR DATABASE MANAGEMENT
SENSOR DATA MINING
WINS ENTERPRISE CUSTOMER
SERVER
2130
SERVER APPLICATIONS
2132
GATEWAY
2104
GATEWAY
GATEWAY APPLICATIONS
GATEWAY O/S
2106
REPEATER
INTERROGATOR
2116
NODE
NODE
NODE
NODE
NODE
NODE
2102
NODE APPLICATION
NODE PROTOCOLS WINSNET
MOBILE NODE
2112

00h00t"2h2h8960

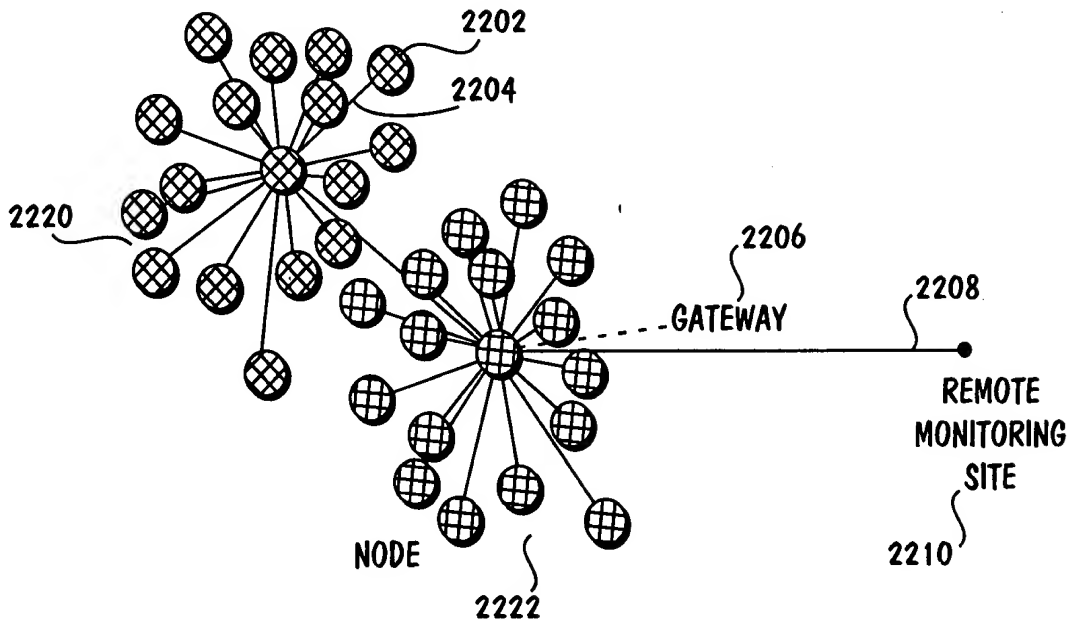


FIG. 22

00h00f" 2h2h3960

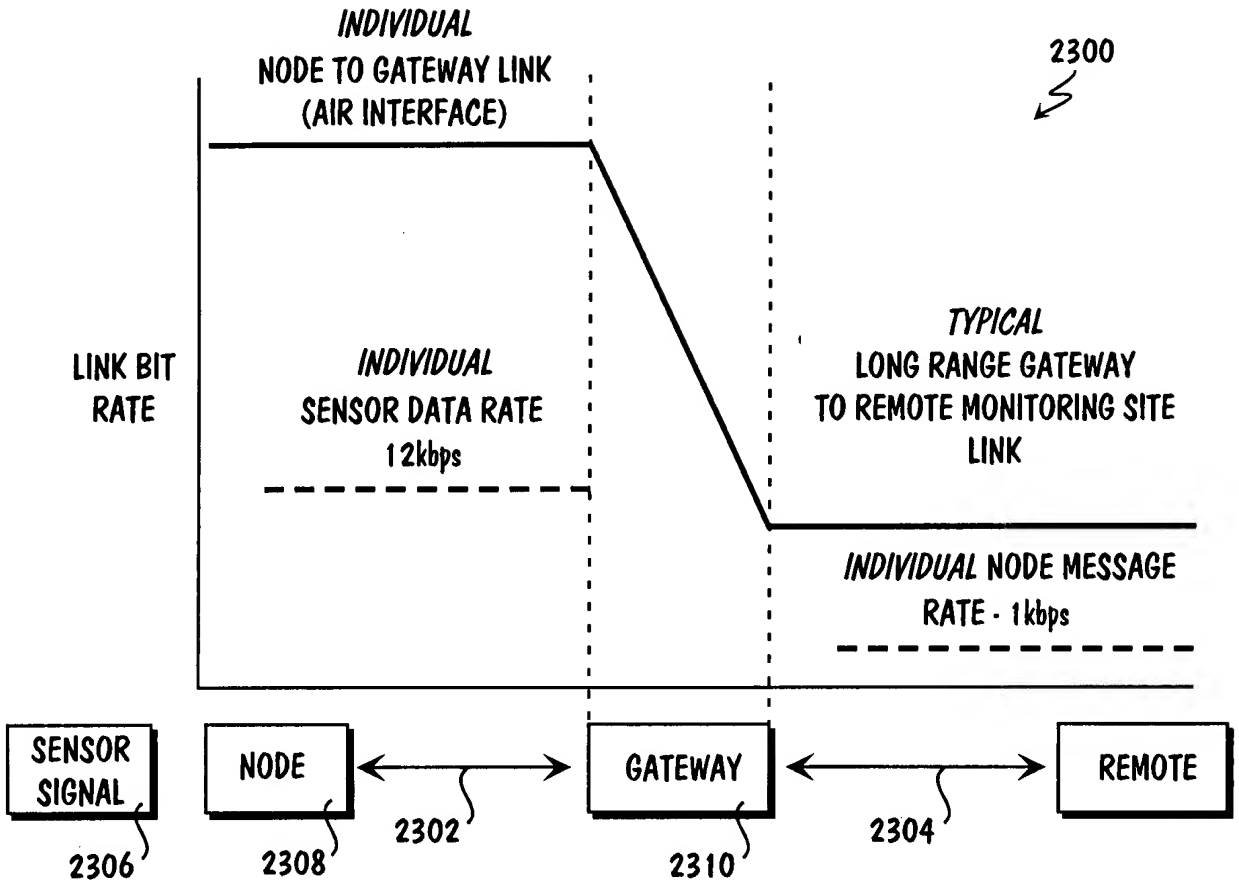


FIG. 23

00h00f" 2h2h8960

2400

FIG. 24

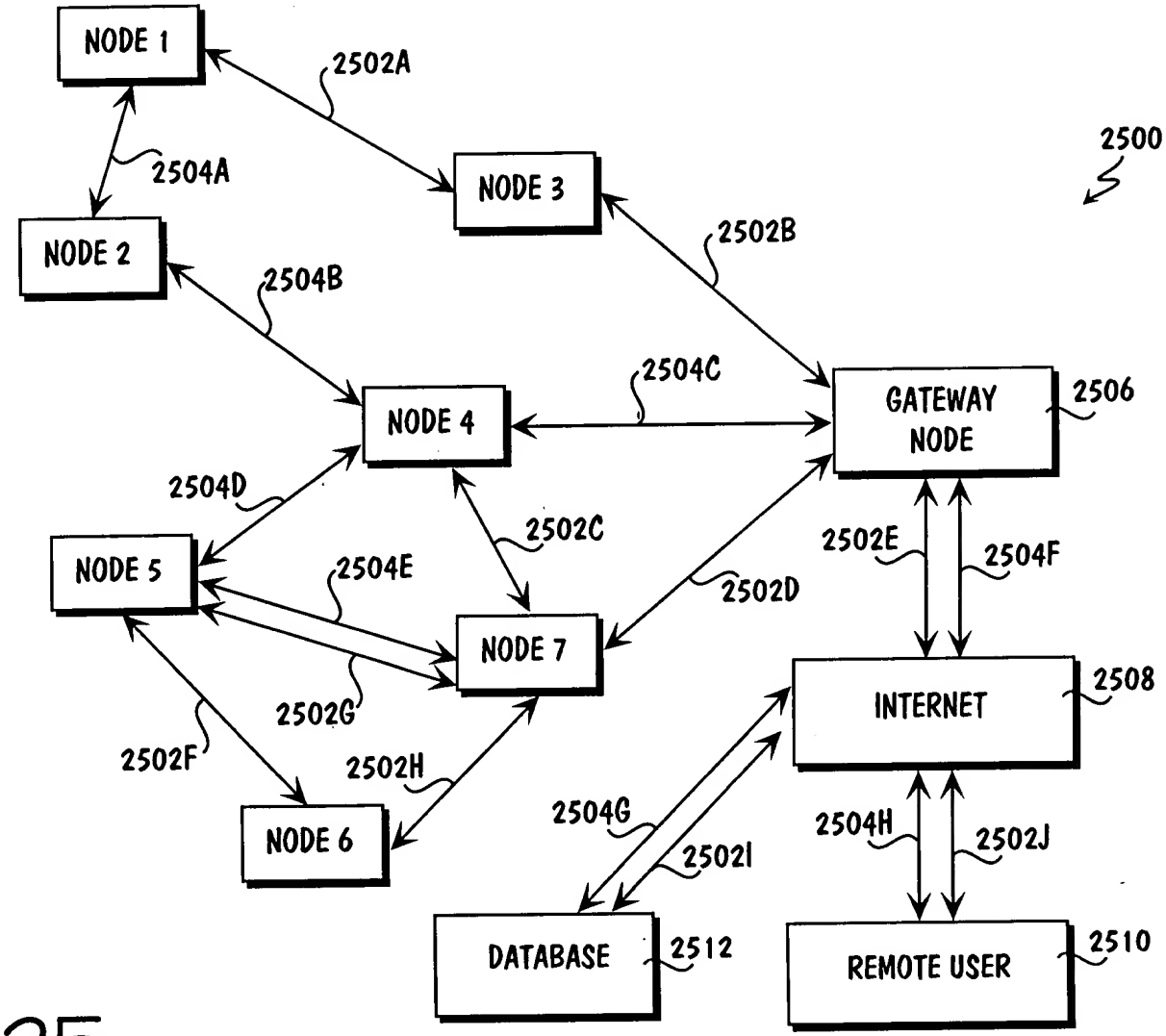

NODE 1
2502A
2500
2504A
NODE 3
NODE 2
2502B
2504B
2504C
GATEWAY NODE
2506
NODE 4
2504D
2502C
2502E
2504F
NODE 5
2504E
2502D
NODE 7
INTERNET
2508
2502G
2502F
2502H
2504G
2504H
2502J
NODE 6
2502I
DATABASE
2512
REMOTE USER
2510

FIG. 25

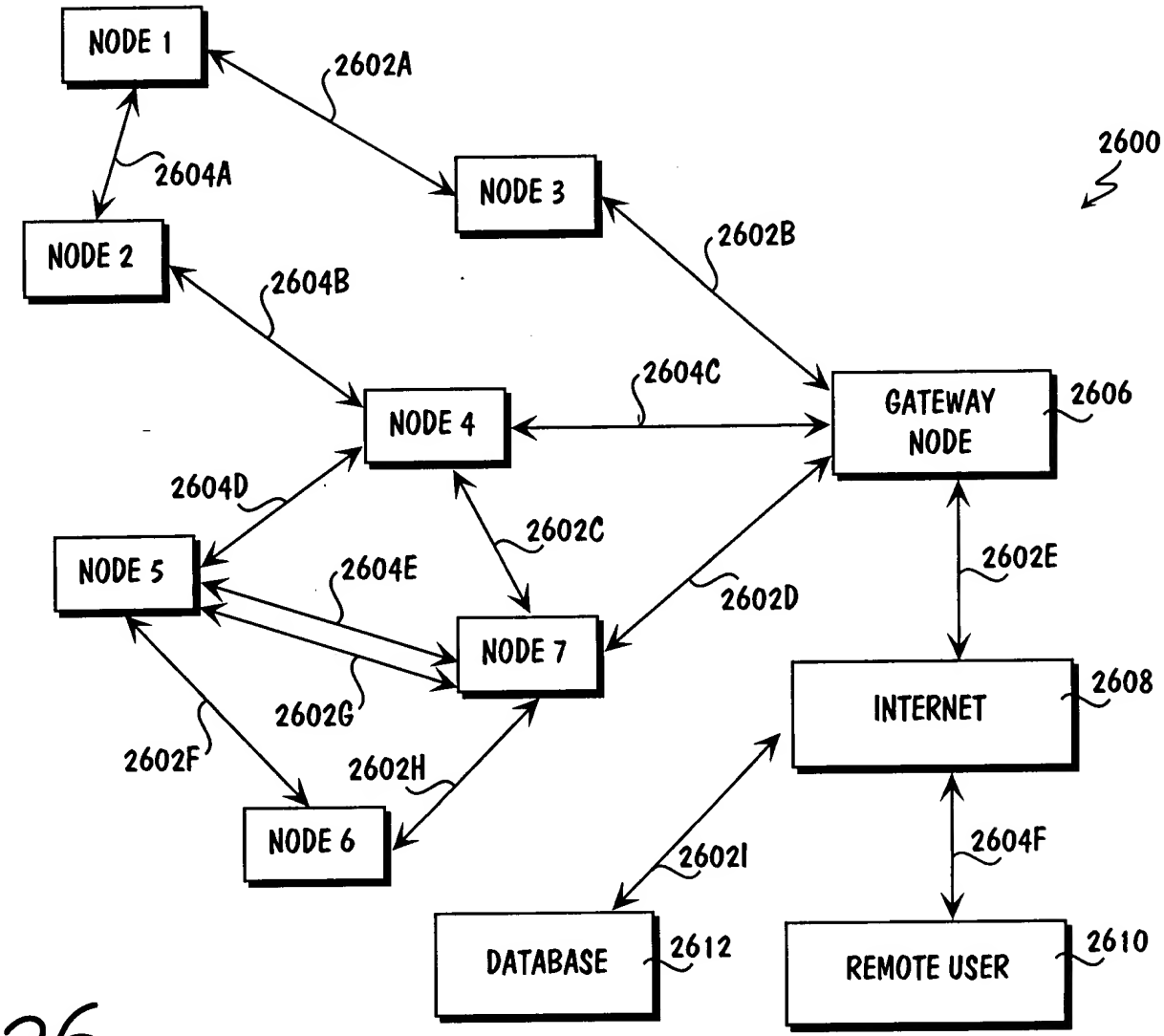

NODE 1
2602A
2600
2604A
NODE 3
NODE 2
2602B
2604B
2604C
NODE 4
GATEWAY NODE
2606
2604D
2602C
2602E
NODE 5
2604E
2602D
NODE 7
INTERNET
2608
2602G
2602F
2602H
NODE 6
2602I
2604F
DATABASE
2612
REMOTE USER
2610

FIG. 26

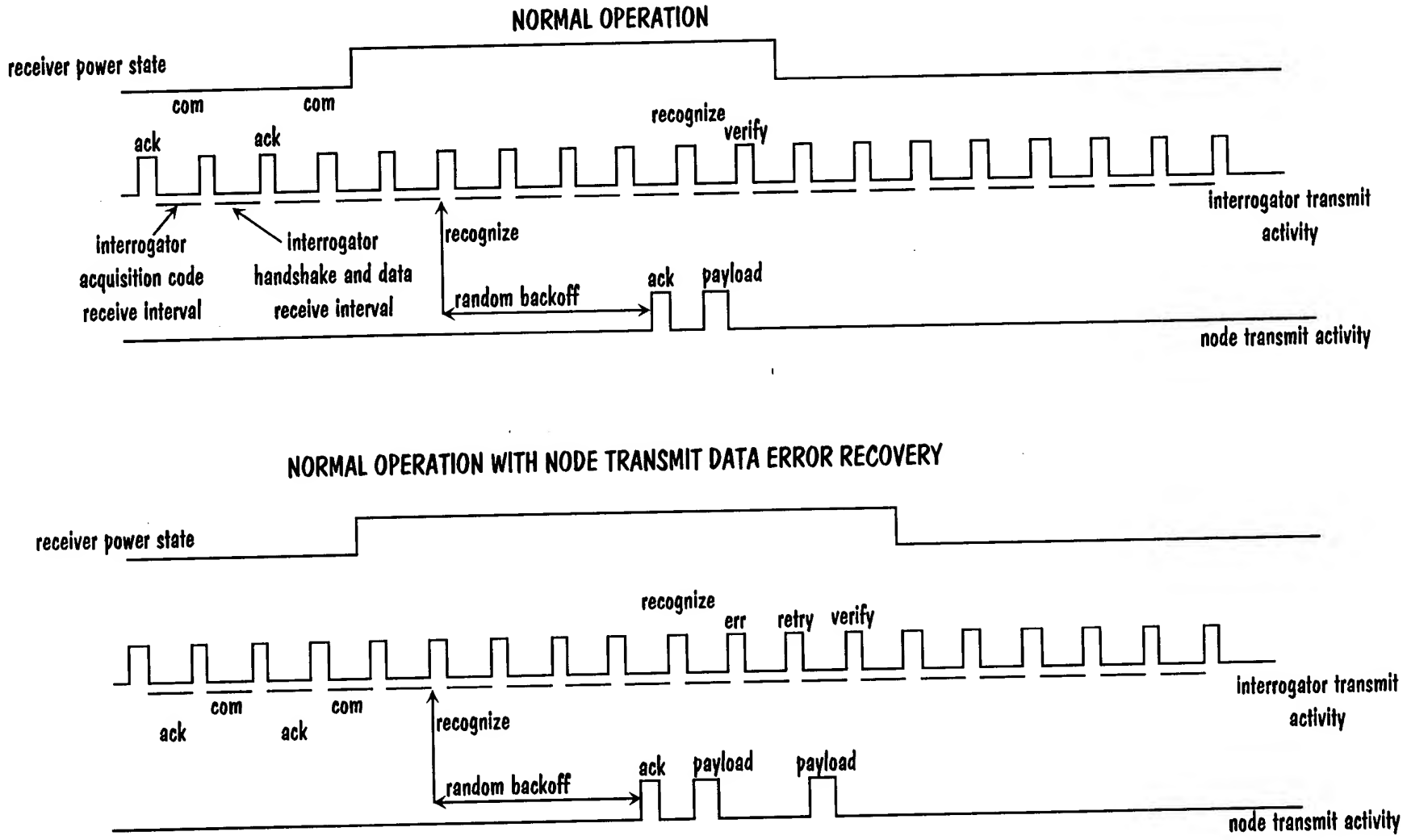

NORMAL OPERATION
receiver power state
com
com
ack
ack
recognize
verify
interrogator transmit activity
interrogator acquisition code receive interval
interrogator handshake and data receive interval
recognize
random backoff
ack
payload
node transmit activity
NORMAL OPERATION WITH NODE TRANSMIT DATA ERROR RECOVERY
receiver power state
recognize
err
retry
verify
interrogator transmit activity
com
com
ack
ack
recognize
random backoff
ack
payload
payload
node transmit activity

FIG. 27

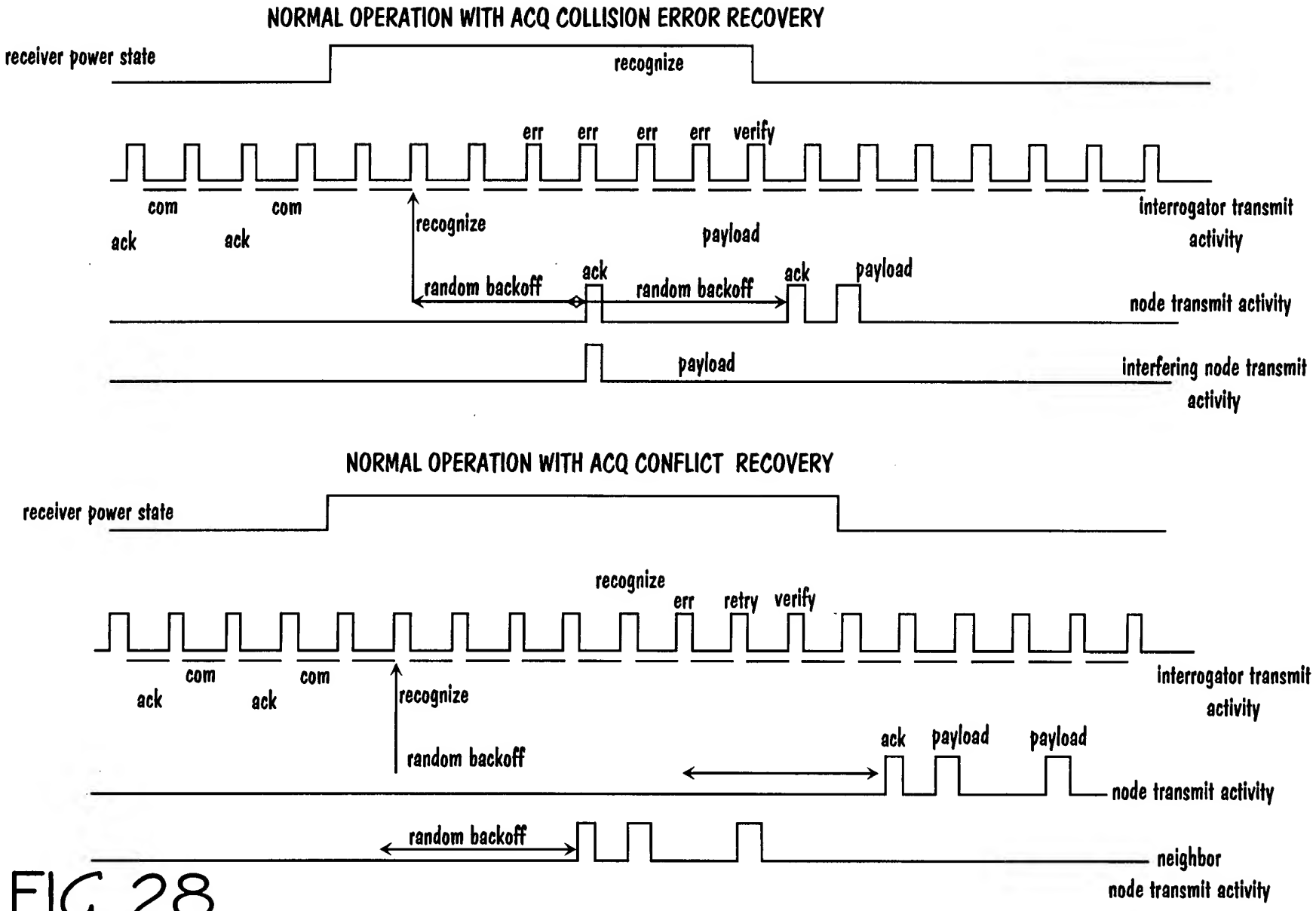

NORMAL OPERATION WITH ACQ COLLISION ERROR RECOVERY
receiver power state
recognize
err
err
err
err
verify
com
com
ack
ack
recognize
payload
interrogator transmit activity
random backoff
ack
random backoff
ack
payload
node transmit activity
payload
interfering node transmit activity
NORMAL OPERATION WITH ACQ CONFLICT RECOVERY
receiver power state
recognize
err
retry
verify
com
com
ack
ack
recognize
interrogator transmit activity
random backoff
ack
payload
payload
node transmit activity
random backoff
neighbor node transmit activity

FIG. 28

09684752.1-2416

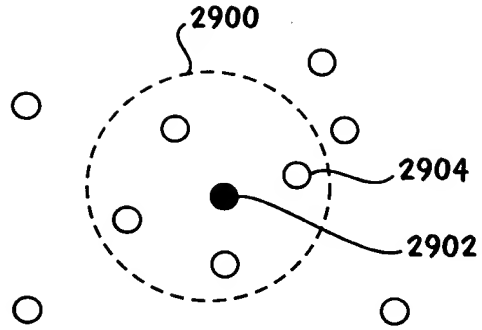


FIG. 29

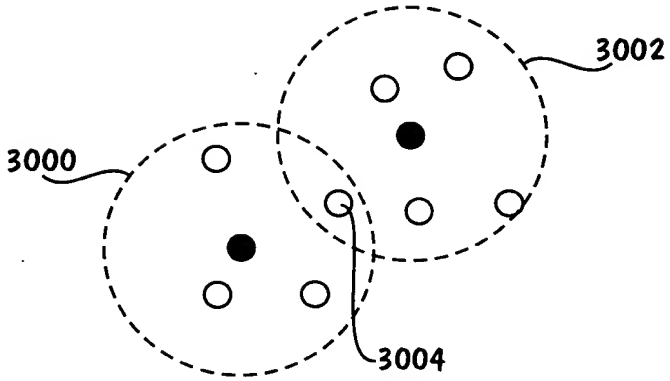


FIG. 30

0040040 - 2454760

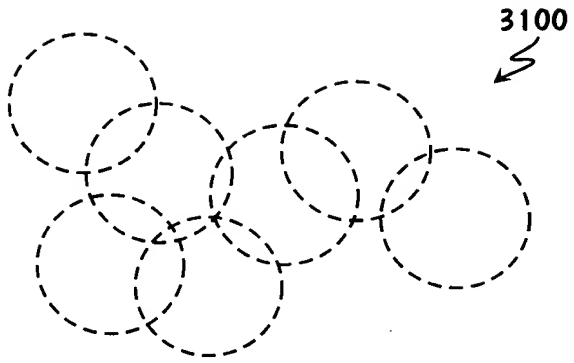


FIG. 31

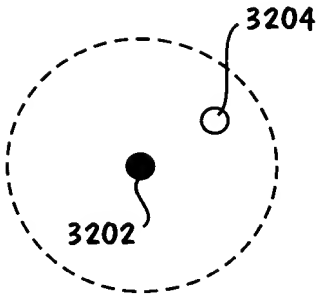


FIG. 32

09684752 - 040404

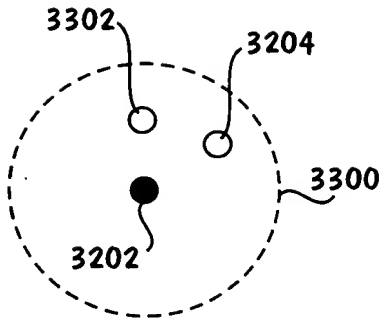


FIG. 33

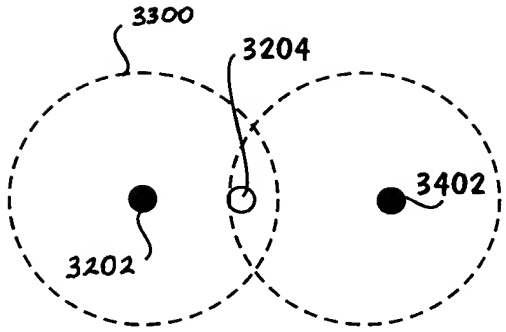


FIG. 34

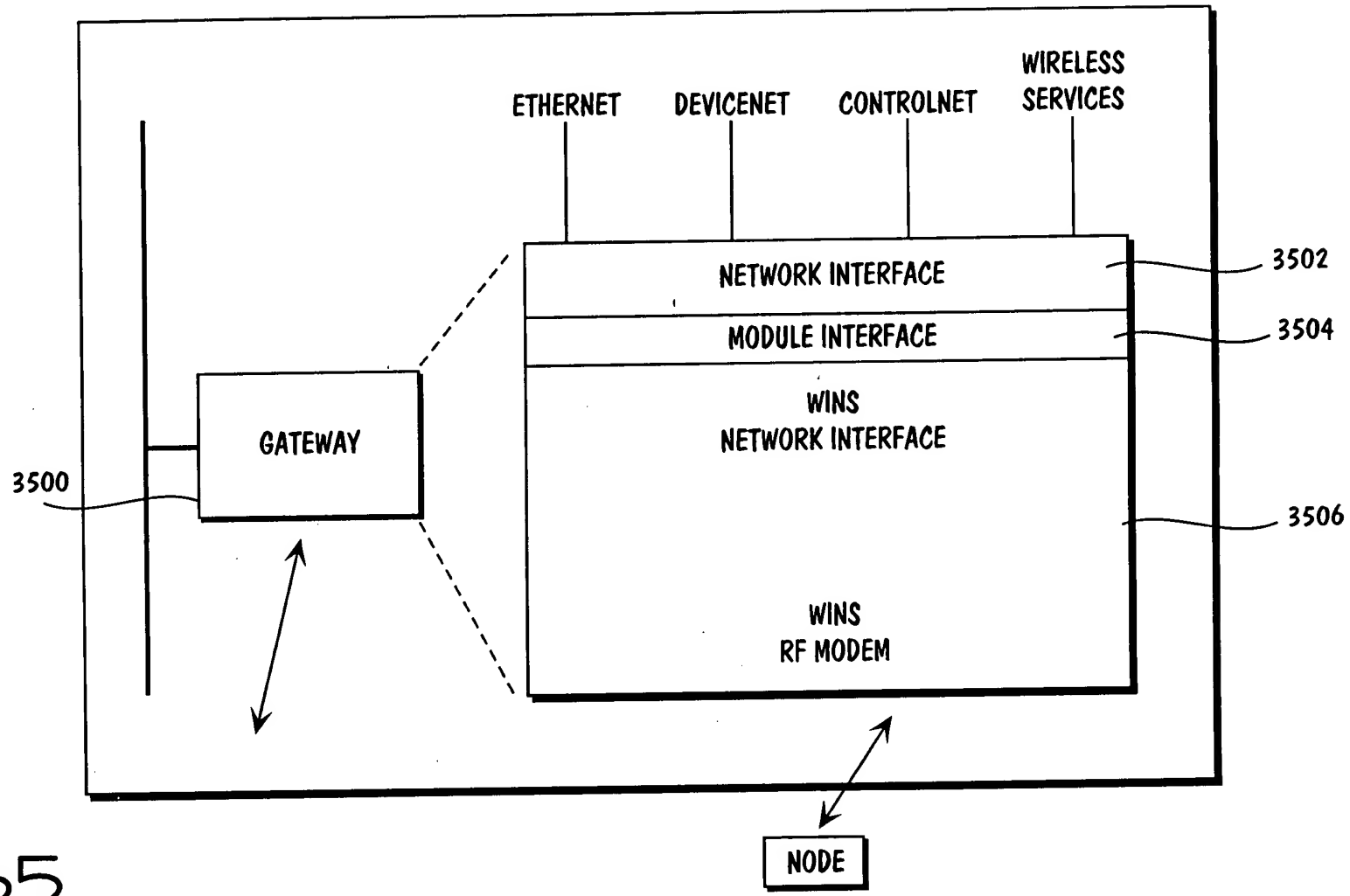

ETHERNET
DEVICENET
CONTROLNET
WIRELESS SERVICES
NETWORK INTERFACE
MODULE INTERFACE
WINS NETWORK INTERFACE
WINS RF MODEM
GATEWAY
3500
3502
3504
3506
NODE

FIG. 35

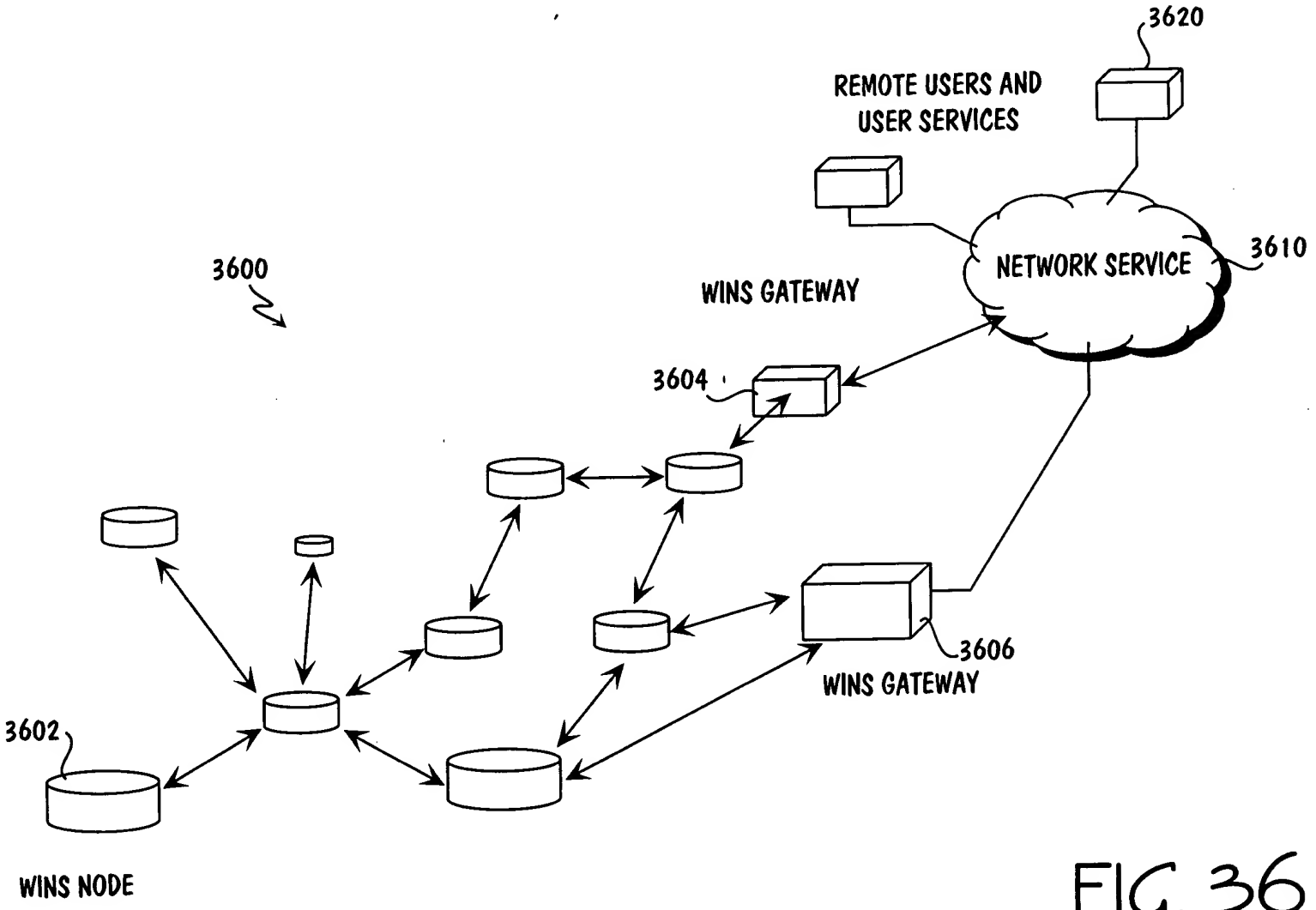

3620
REMOTE USERS AND
USER SERVICES
NETWORK SERVICE
3610
3600
WINS GATEWAY
3604
3606
WINS GATEWAY
3602
WINS NODE

FIG. 36

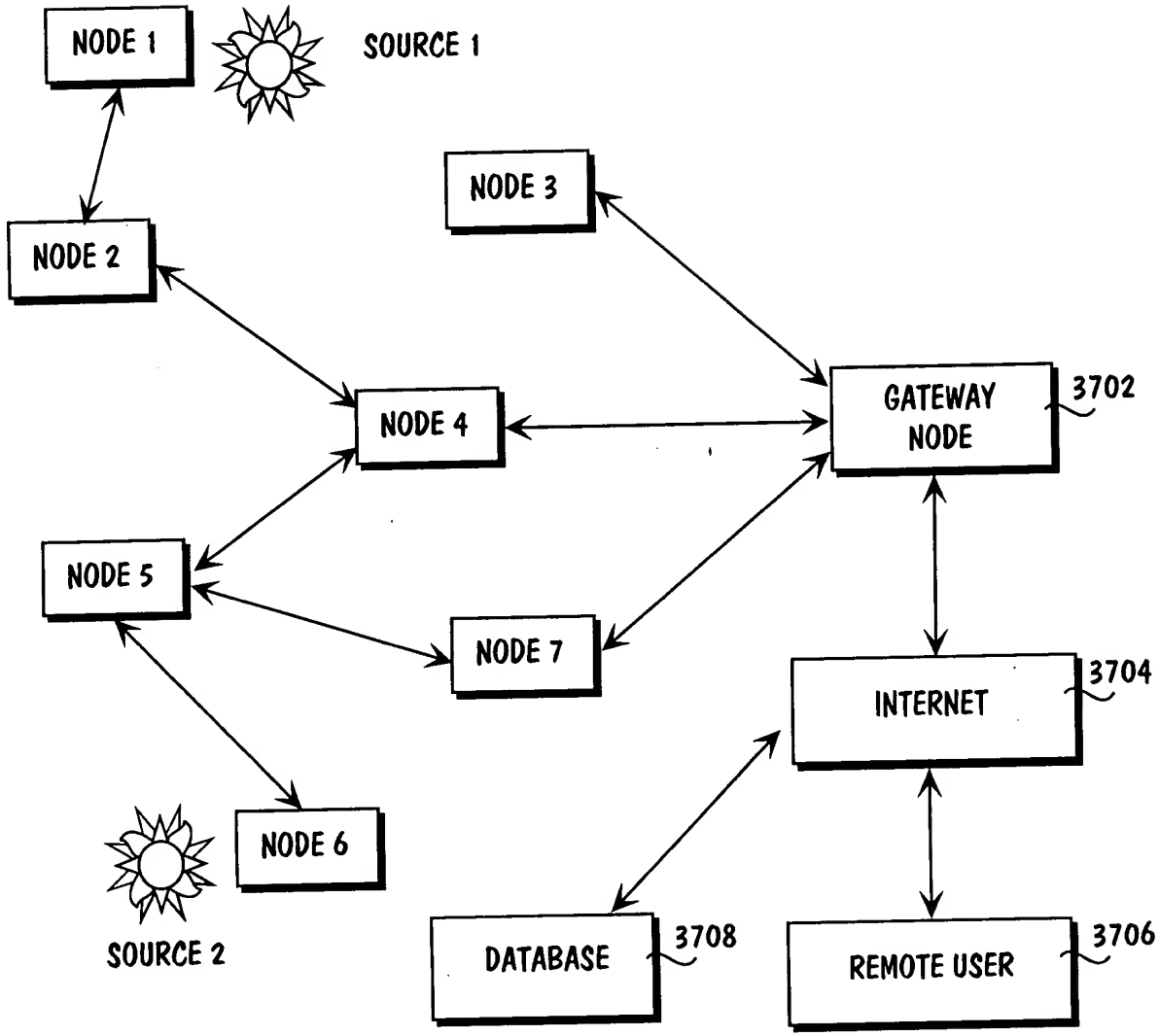

NODE 1
SOURCE 1
NODE 3
NODE 2
NODE 4
GATEWAY NODE
3702
NODE 5
NODE 7
INTERNET
3704
NODE 6
SOURCE 2
DATABASE
3708
REMOTE USER
3706

FIG. 37

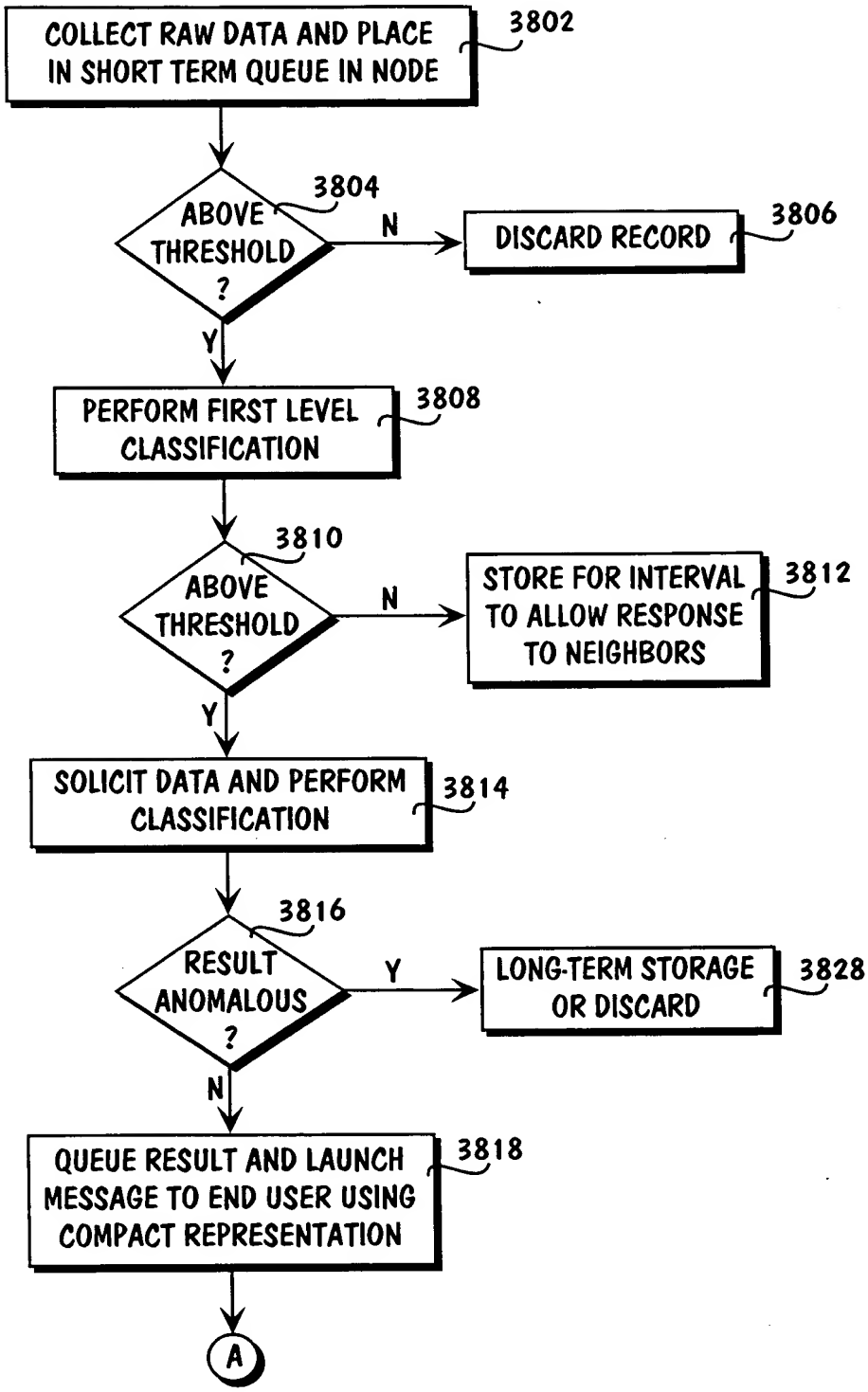

COLLECT RAW DATA AND PLACE IN SHORT TERM QUEUE IN NODE
3802
ABOVE THRESHOLD ?
3804
N
DISCARD RECORD
3806
Y
PERFORM FIRST LEVEL CLASSIFICATION
3808
ABOVE THRESHOLD ?
3810
N
STORE FOR INTERVAL TO ALLOW RESPONSE TO NEIGHBORS
3812
Y
SOLICIT DATA AND PERFORM CLASSIFICATION
3814
RESULT ANOMALOUS ?
3816
Y
LONG-TERM STORAGE OR DISCARD
3828
N
QUEUE RESULT AND LAUNCH MESSAGE TO END USER USING COMPACT REPRESENTATION
3818
A

FIG. 38A

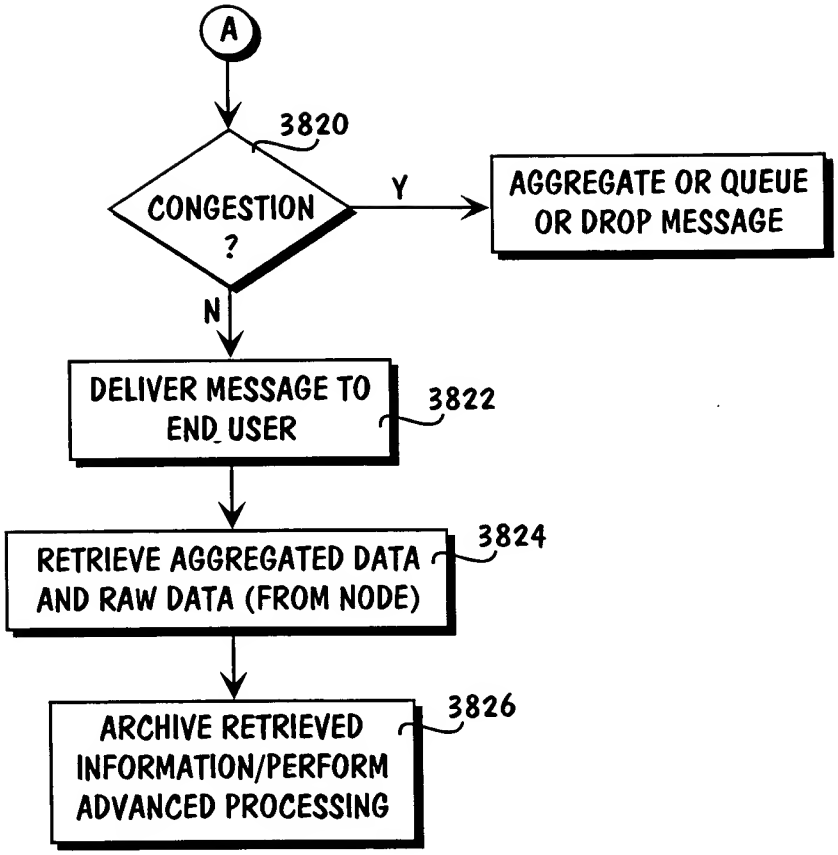

A
3820
CONGESTION ?
Y
AGGREGATE OR QUEUE OR DROP MESSAGE
N
DELIVER MESSAGE TO END_USER
3822
RETRIEVE AGGREGATED DATA AND RAW DATA (FROM NODE)
3824
ARCHIVE RETRIEVED INFORMATION/PERFORM ADVANCED PROCESSING
3826

FIG. 38B

00h00f" 24h24896O

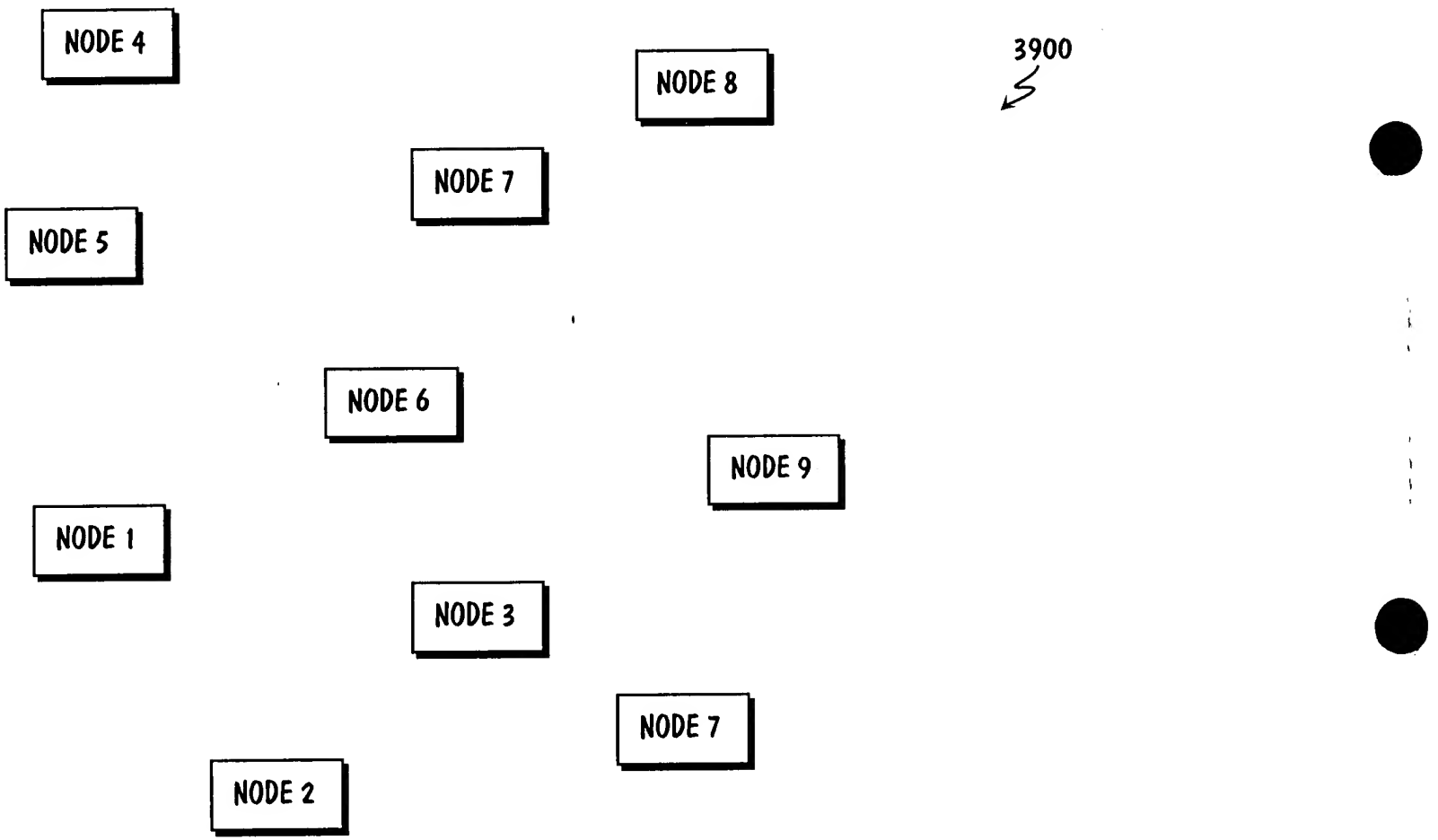


FIG. 39

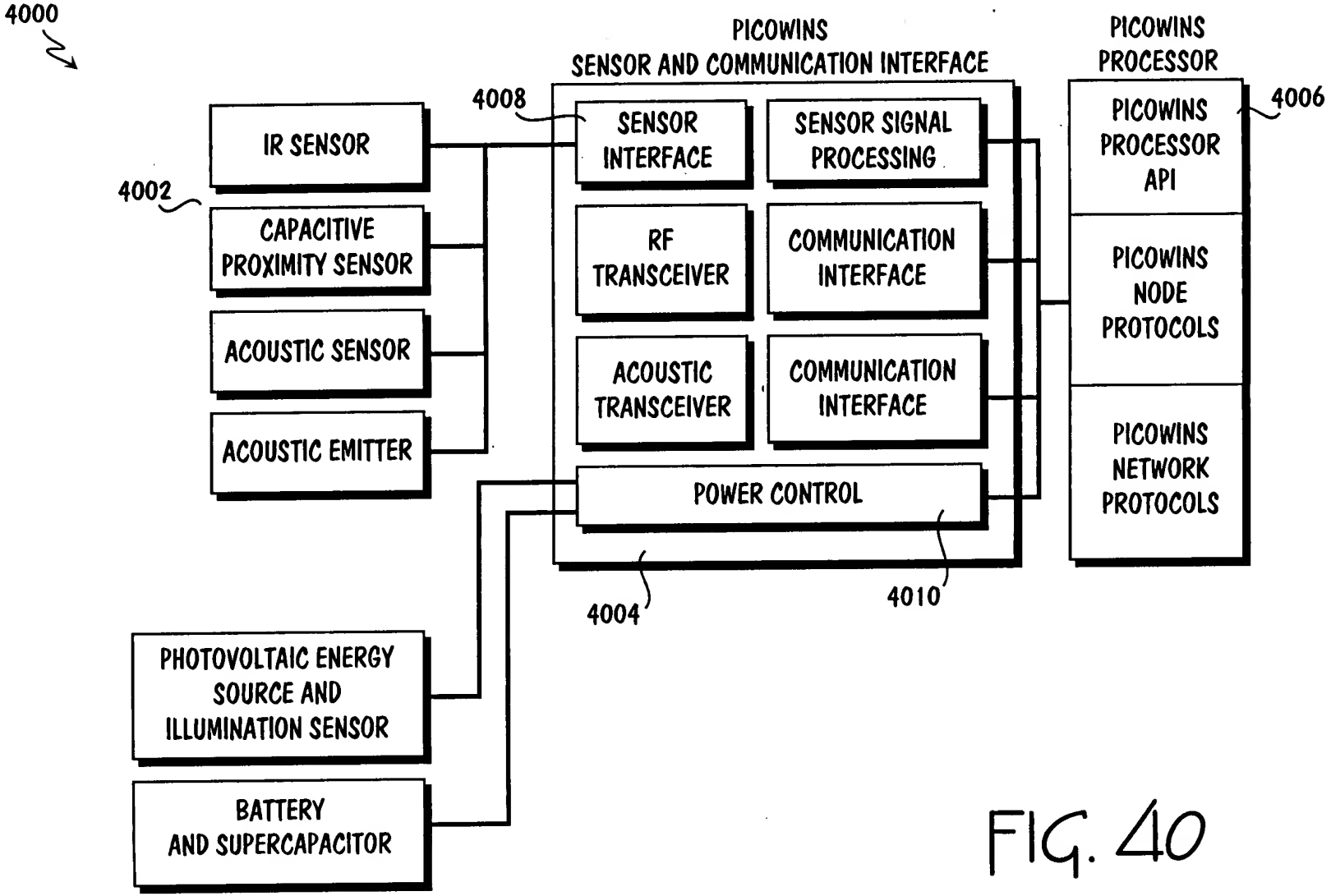

4000
PICOWINS
SENSOR AND COMMUNICATION INTERFACE
PICOWINS
PROCESSOR
4008
4006
IR SENSOR
4002
CAPACITIVE
PROXIMITY SENSOR
ACOUSTIC SENSOR
ACOUSTIC EMITTER
SENSOR
INTERFACE
SENSOR SIGNAL
PROCESSING
RF
TRANSCEIVER
COMMUNICATION
INTERFACE
ACOUSTIC
TRANSCEIVER
COMMUNICATION
INTERFACE
POWER CONTROL
PICOWINS
PROCESSOR
API
PICOWINS
NODE
PROTOCOLS
PICOWINS
NETWORK
PROTOCOLS
4004
4010
PHOTOVOLTAIC ENERGY
SOURCE AND
ILLUMINATION SENSOR
BATTERY
AND SUPERCAPACITOR

FIG. 40

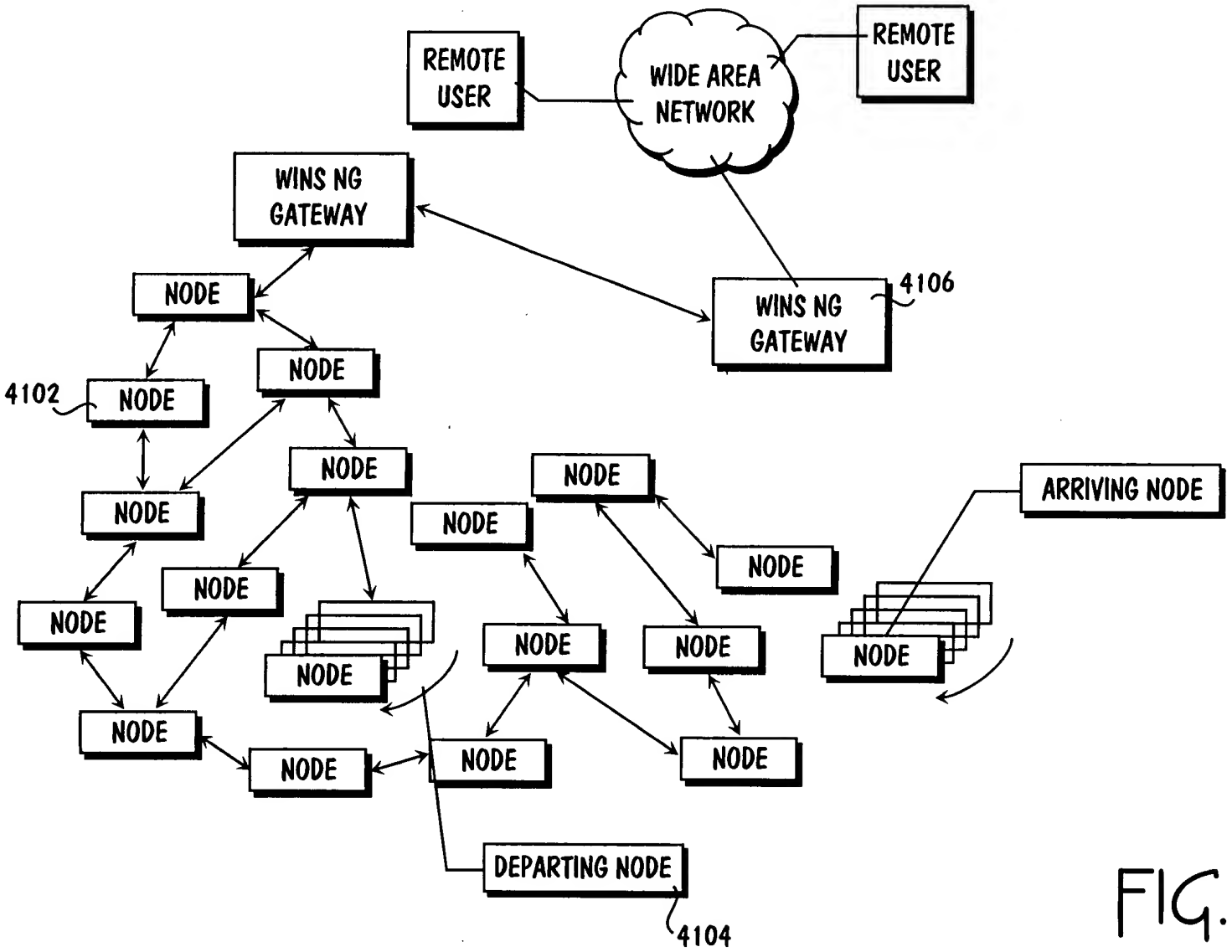

REMOTE USER
WIDE AREA NETWORK
REMOTE USER
WINS NG GATEWAY
NODE
4106
WINS NG GATEWAY
NODE
4102
NODE
NODE
NODE
NODE
NODE
NODE
ARRIVING NODE
NODE
NODE
NODE
NODE
NODE
NODE
NODE
NODE
NODE
NODE
NODE
NODE
NODE
DEPARTING NODE
4104

FIG. 41

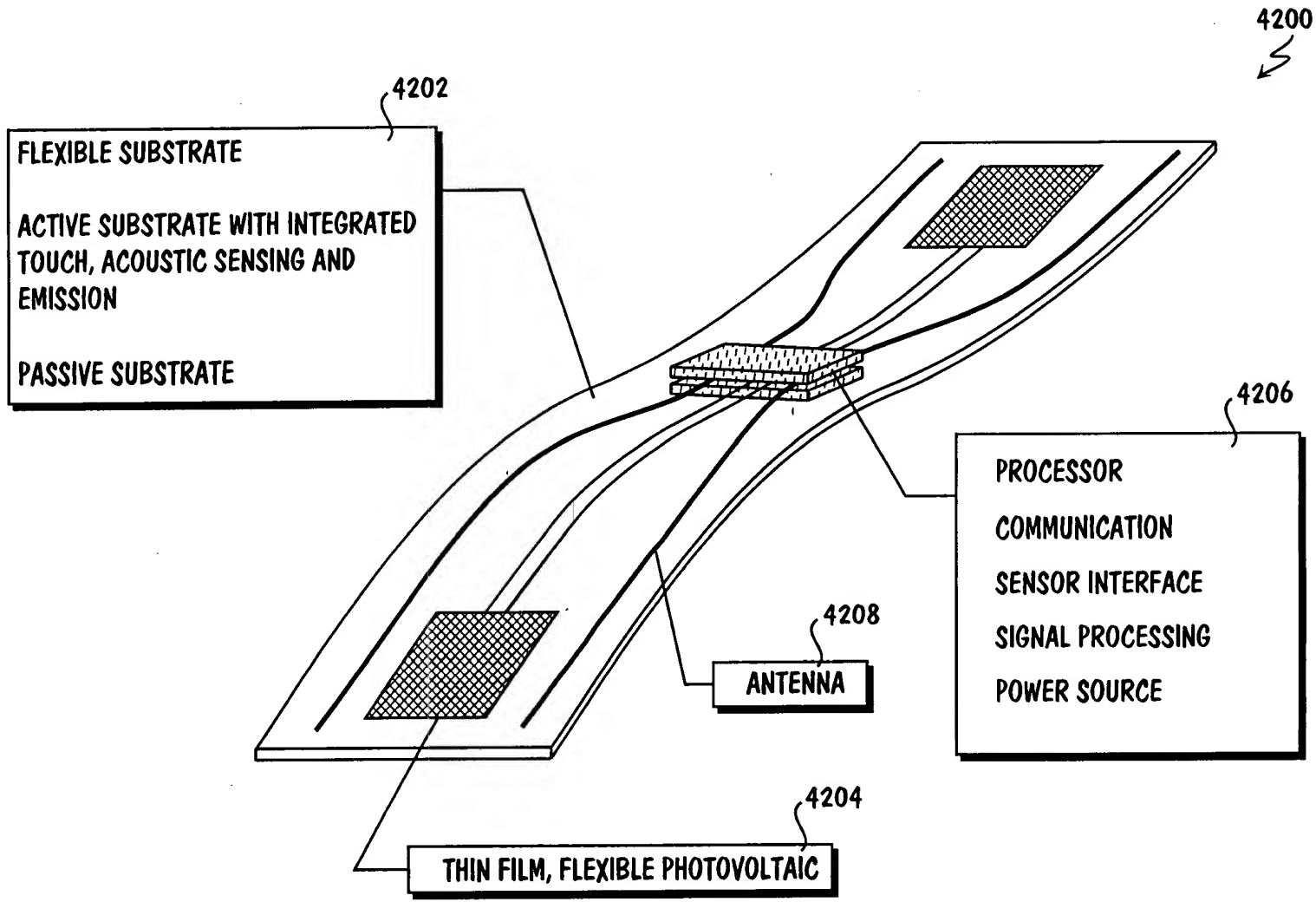

4200
4202
FLEXIBLE SUBSTRATE
ACTIVE SUBSTRATE WITH INTEGRATED TOUCH, ACOUSTIC SENSING AND EMISSION
PASSIVE SUBSTRATE
4206
PROCESSOR
COMMUNICATION
SENSOR INTERFACE
SIGNAL PROCESSING
POWER SOURCE
4208
ANTENNA
4204
THIN FILM, FLEXIBLE PHOTOVOLTAIC

FIG. 42

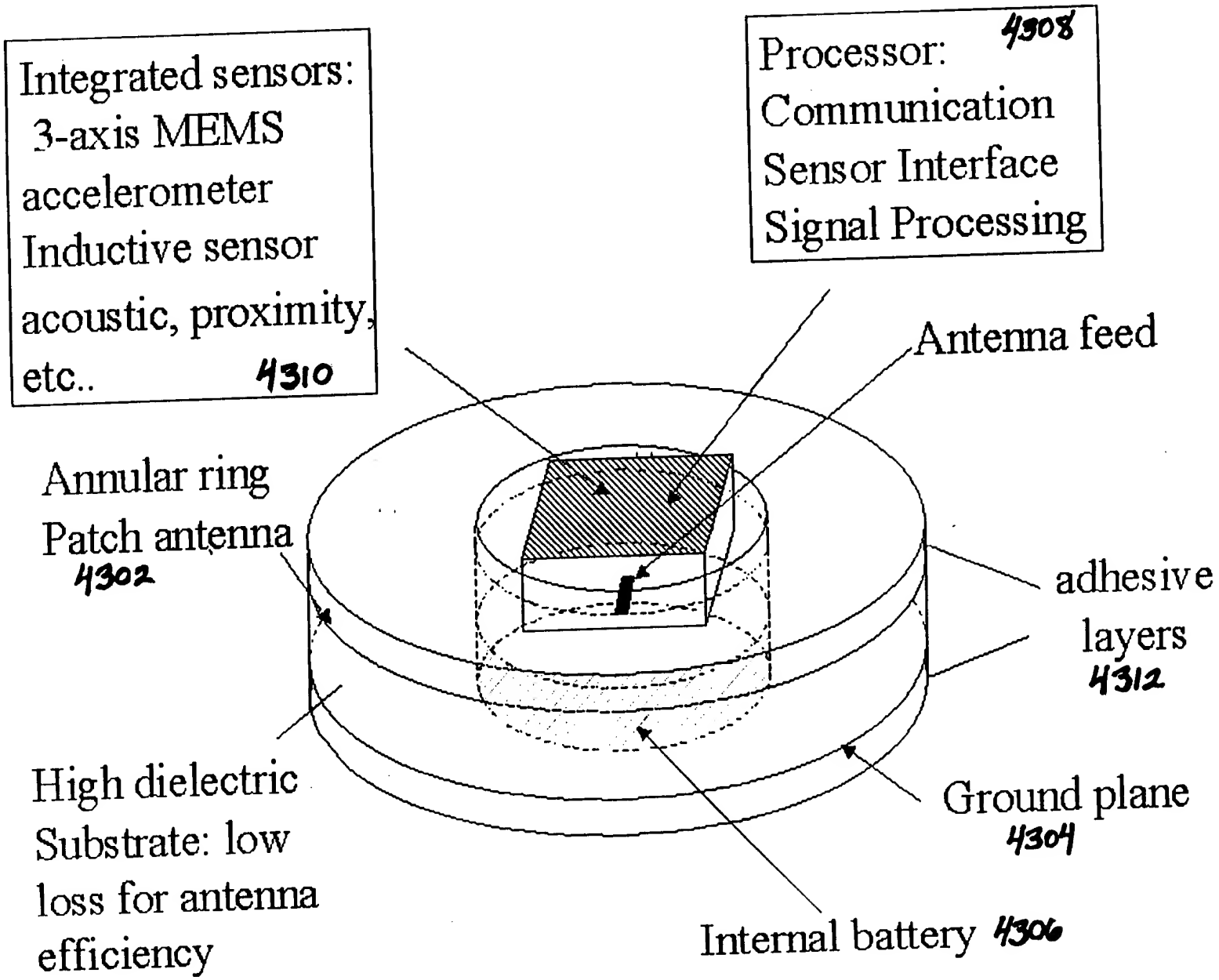
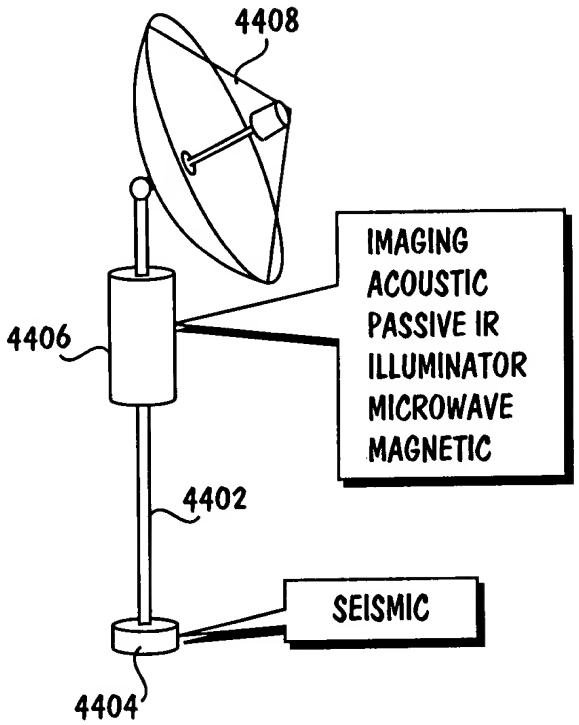

Integrated sensors:
3-axis MEMS accelerometer
Inductive sensor
acoustic, proximity, etc..
4310
Processor:
4308
Communication
Sensor Interface
Signal Processing
Antenna feed
Annular ring
Patch antenna
4302
adhesive layers
4312
High dielectric Substrate: low loss for antenna efficiency
Ground plane
4304
Internal battery 4306

FIGURE 43


4408
IMAGING
ACOUSTIC
PASSIVE IR
ILLUMINATOR
MICROWAVE
MAGNETIC
4406
4402
SEISMIC
4404

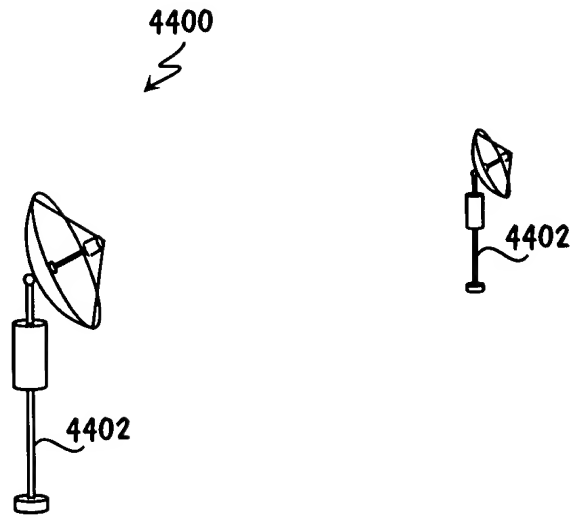

4400
4402
4402

FIG. 44

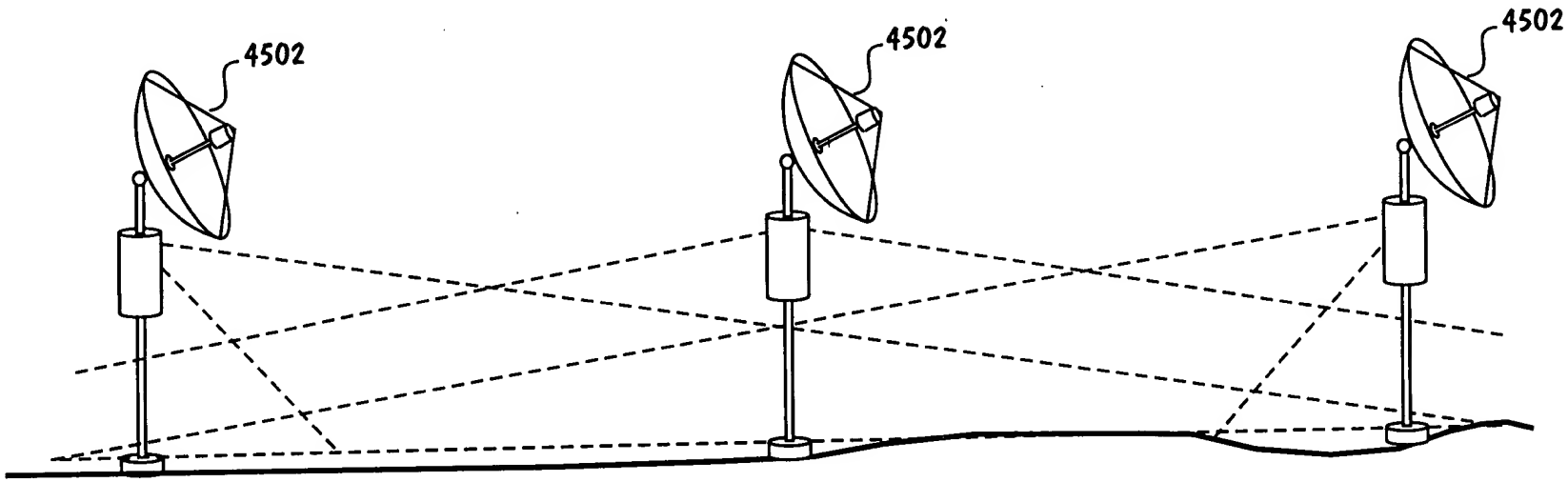


FIG. 45

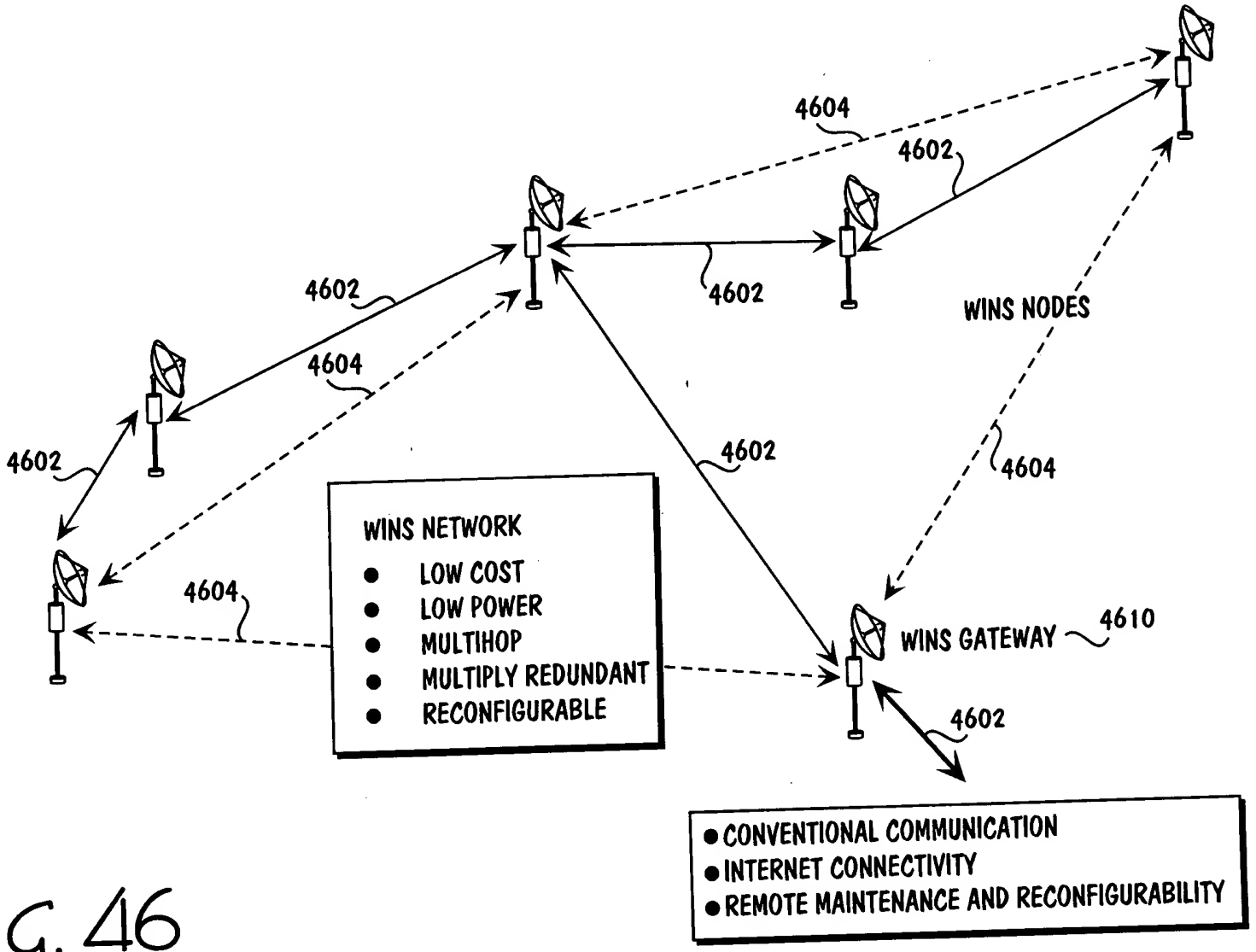
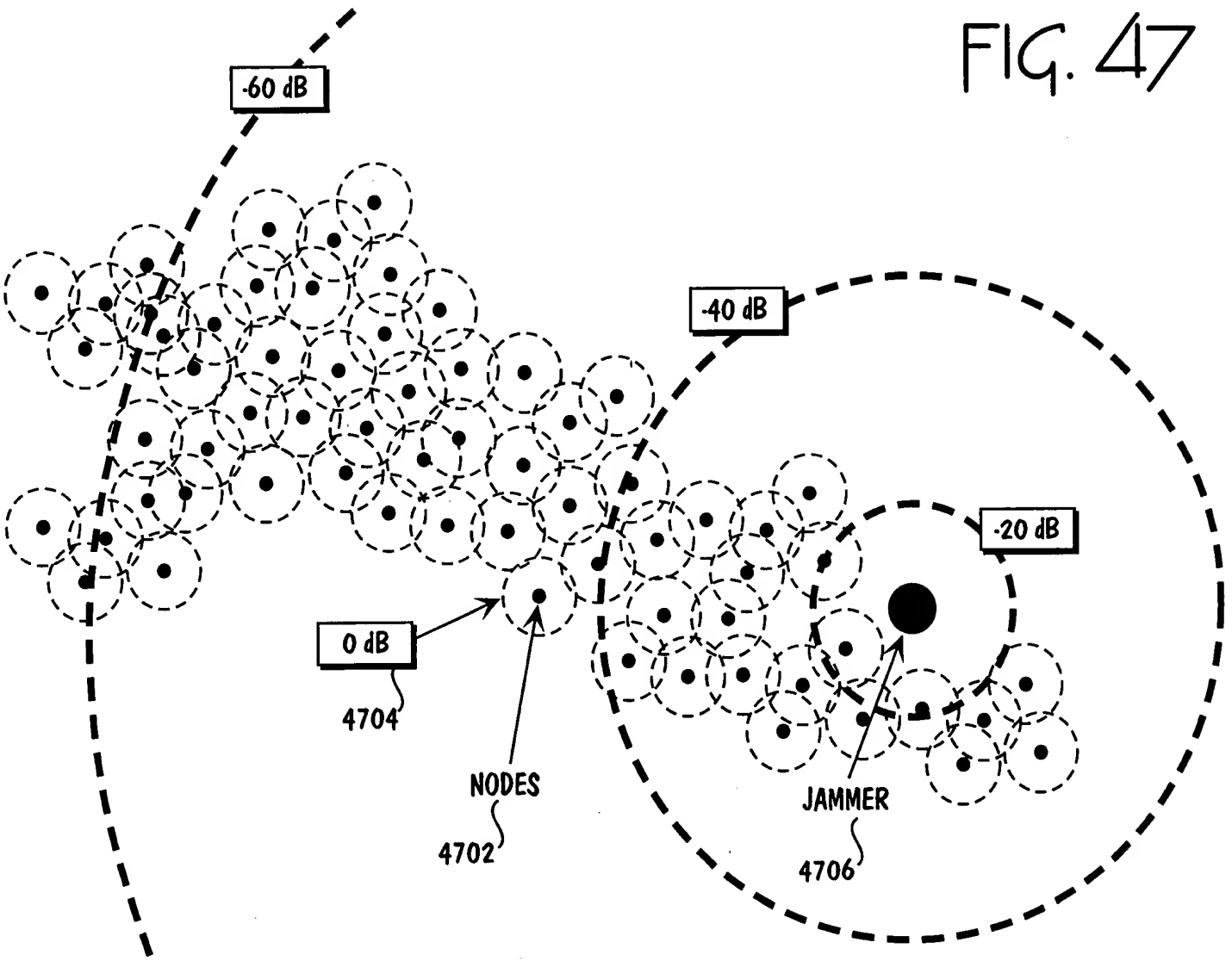

4604
4602
4602
4602
WINS NODES
4602
4604
4602
4604
4604
WINS NETWORK
LOW COST
LOW POWER
MULTIHOP
MULTIPLY REDUNDANT
RECONFIGURABLE
WINS GATEWAY
4610
4602
CONVENTIONAL COMMUNICATION
INTERNET CONNECTIVITY
REMOTE MAINTENANCE AND RECONFIGURABILITY

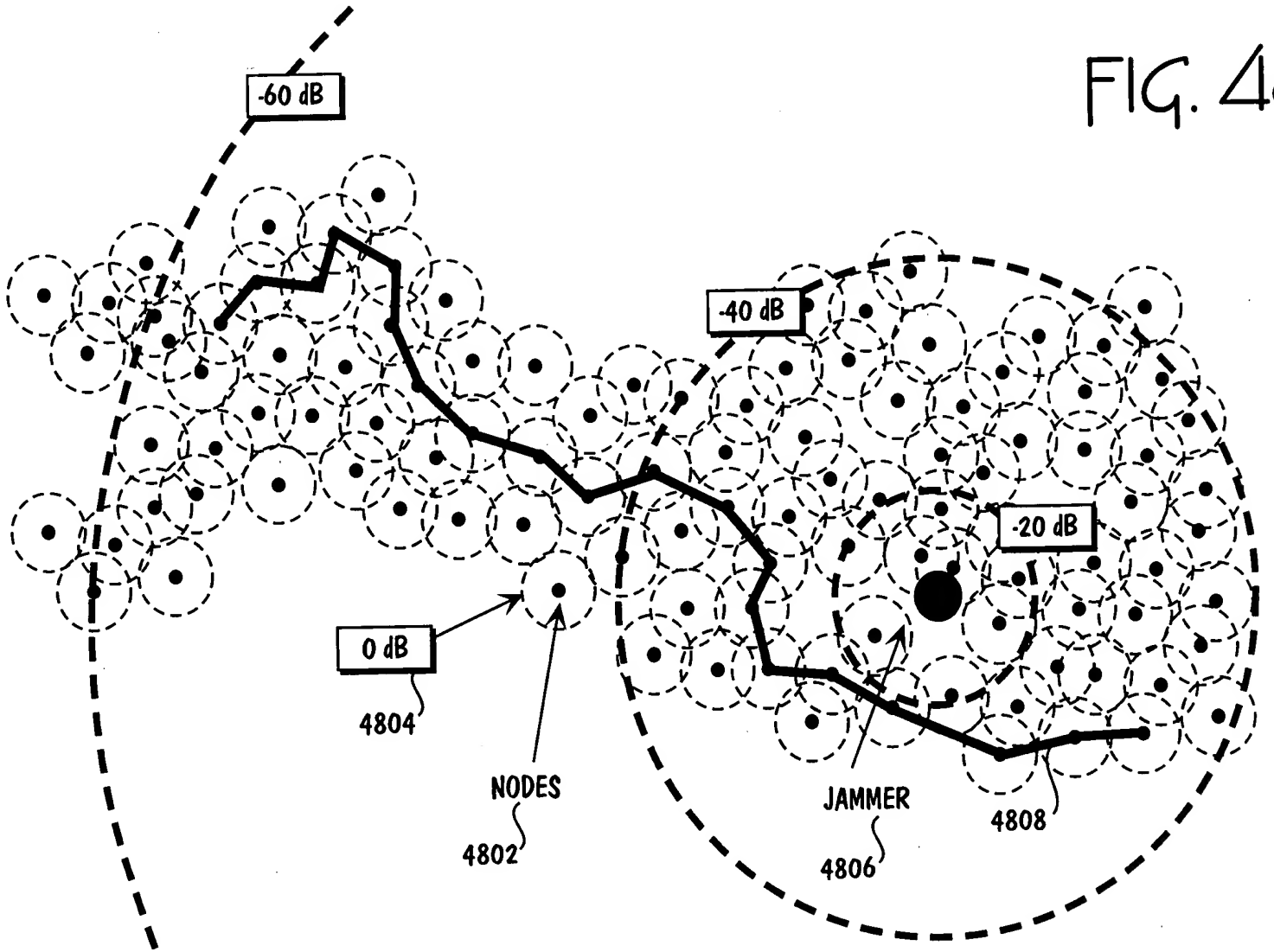
FIG. 46

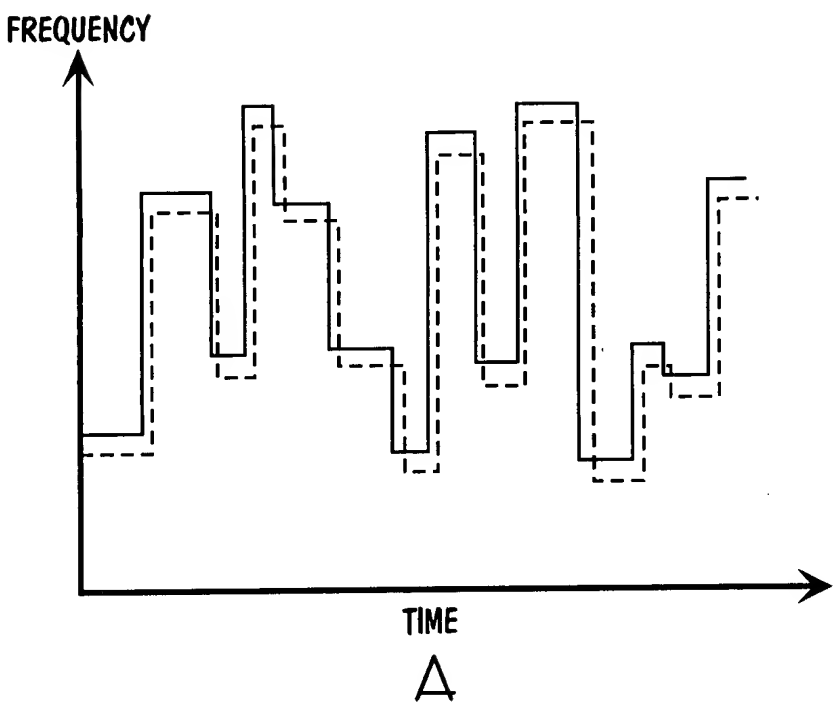
FIG. 47



00h00T" 2h2h8960

FIG. 48





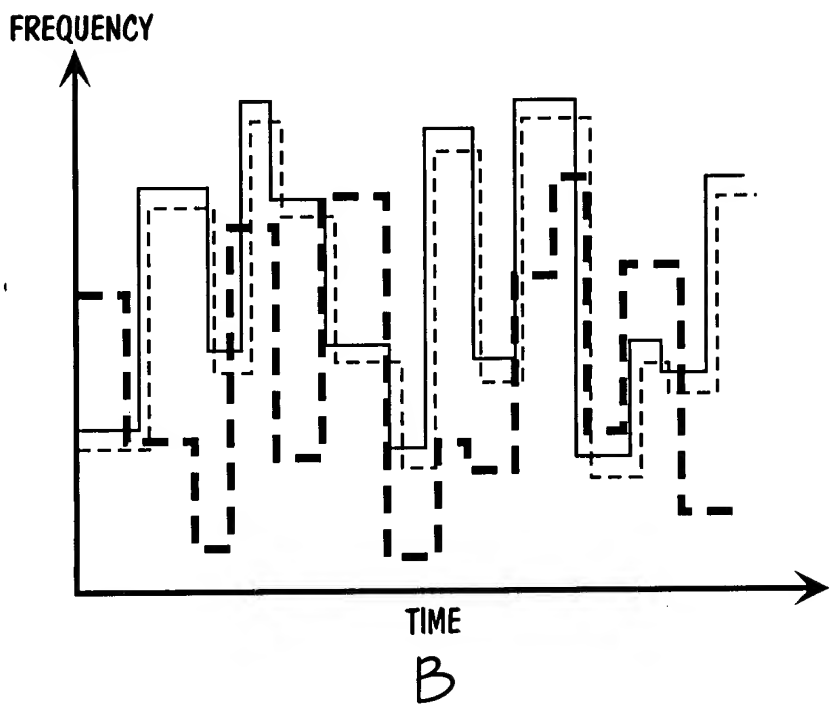


FIG. 49

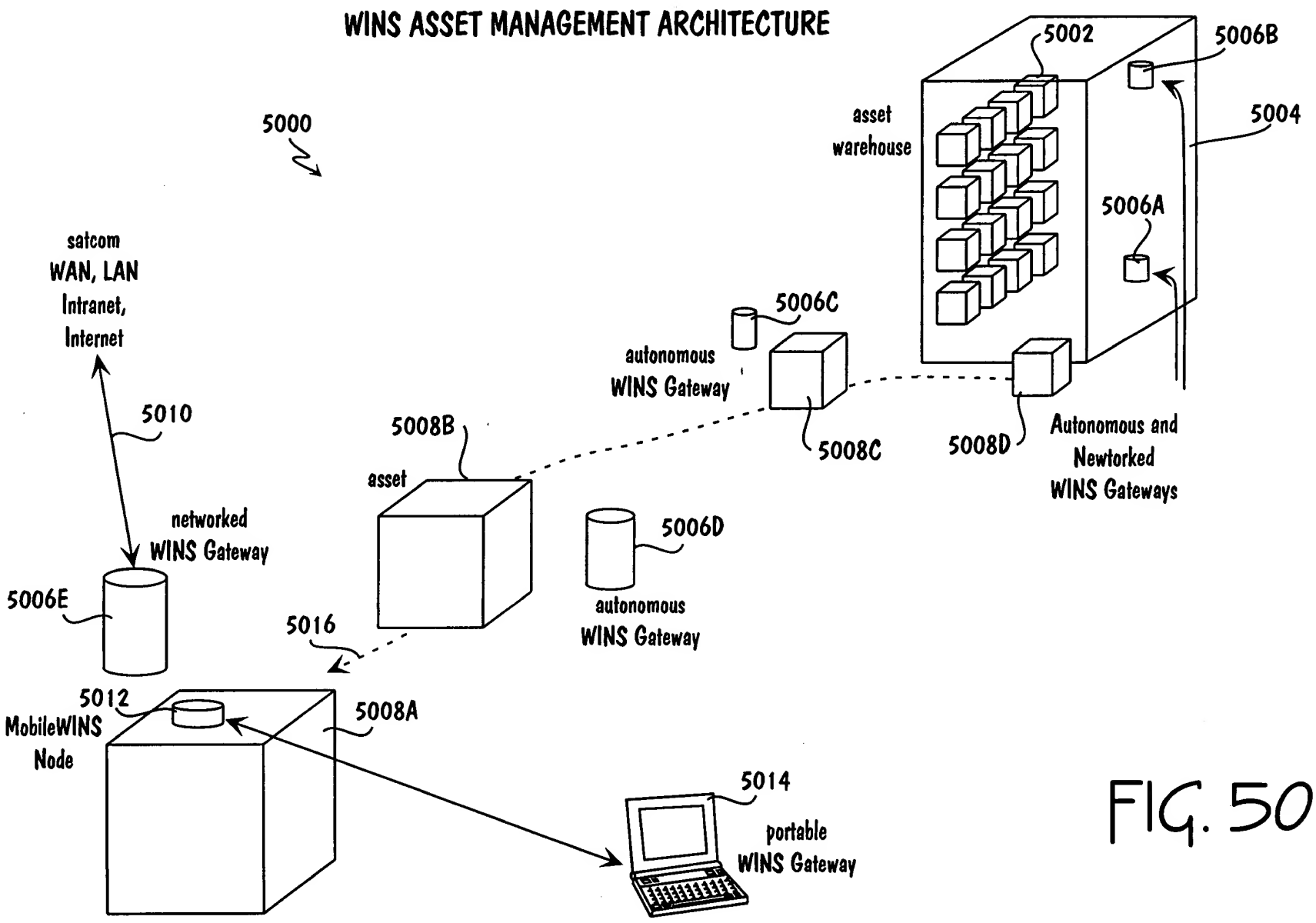

WINS ASSET MANAGEMENT ARCHITECTURE
5000
5002
5006B
5004
asset
warehouse
5006A
satcom
WAN, LAN
Intranet,
Internet
5006C
autonomous
WINS Gateway
5010
5008B
asset
5008C
5008D
Autonomous and
Newtorked
WINS Gateways
networked
WINS Gateway
5006D
5006E
autonomous
WINS Gateway
5016
5012
MobileWINS
Node
5008A
5014
portable
WINS Gateway

FIG. 50

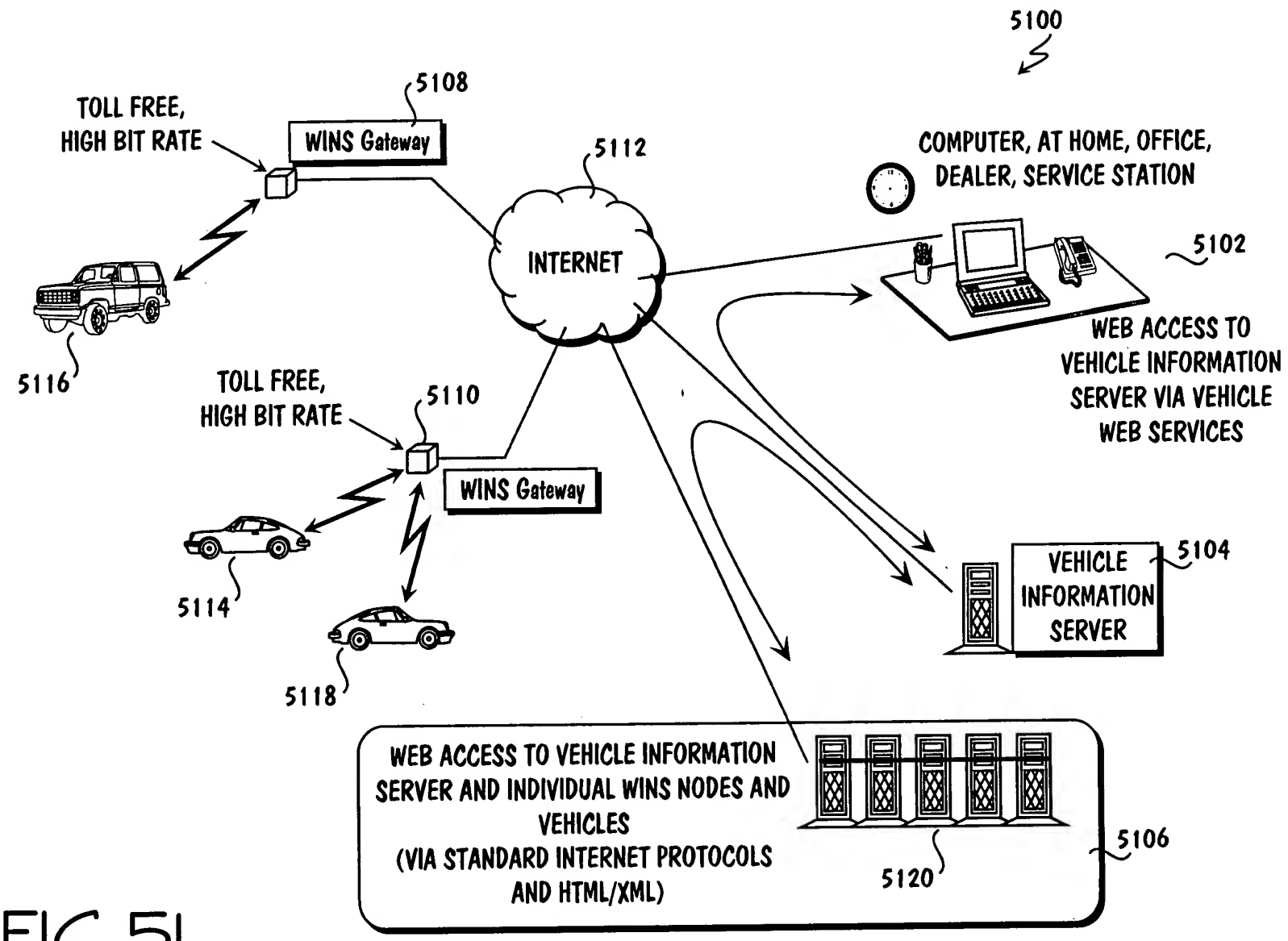

5100
5108
TOLL FREE,
HIGH BIT RATE
WINS Gateway
5112
INTERNET
COMPUTER, AT HOME, OFFICE,
DEALER, SERVICE STATION
5102
WEB ACCESS TO
VEHICLE INFORMATION
SERVER VIA VEHICLE
WEB SERVICES
5116
TOLL FREE,
HIGH BIT RATE
5110
WINS Gateway
5114
5118
VEHICLE
INFORMATION
SERVER
5104
WEB ACCESS TO VEHICLE INFORMATION
SERVER AND INDIVIDUAL WINS NODES AND
VEHICLES
(VIA STANDARD INTERNET PROTOCOLS
AND HTML/XML)
5120
5106

FIG. 51

00h00f"2h2h8960

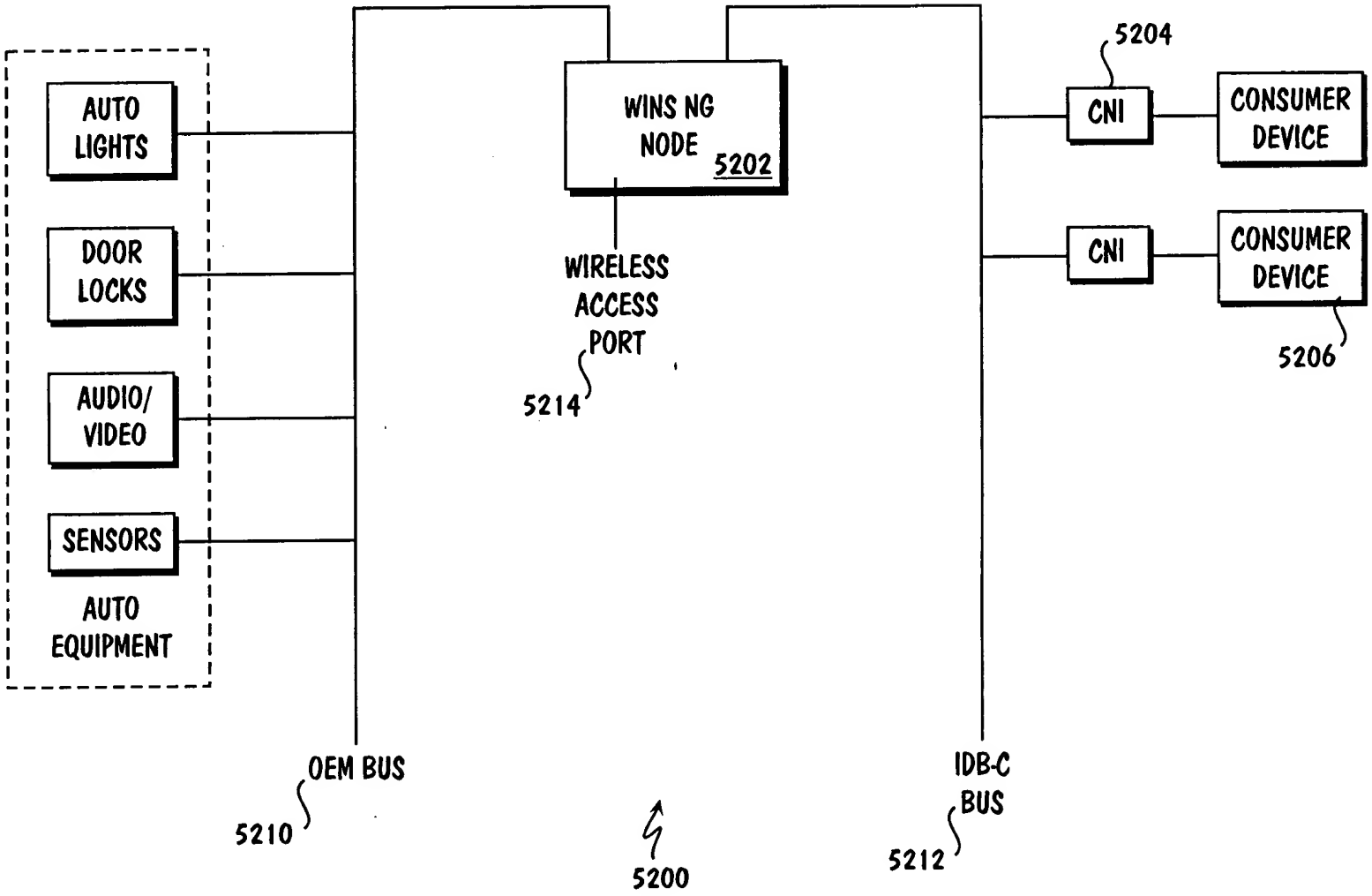


FIG. 52